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NEWARK, DELAWARE.

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DELAWARE COLLEGE.—RECITATION HALL.

CATALOGUE

OF

Delaware College,

NEWARK, DELAWARE.

1896.

Calendars.

1896.

FALL TERM.

Sept.	15.	Examinations for Admission, Tuesday, 10 A. M.
	16.	First Term begins Wednesday.
Dec.	16-18.	First Term Examinations.
	18.	First Term ends Friday afternoon.

WINTER VACATION.

1897.

Jan.	6.	Second Term begins Wednesday.
Mar.	24-26.	Examinations for Second Term.
	26.	Second Term ends Friday evening.
Apr.	7.	Third Term begins Wednesday.
June	7-14.	Annual Examinations.
	13.	Baccalaureate Sermon.
	15.	Annual Meeting of Board of Trustees.
	15.	Anniversary of Athenæan Literary Society.
	16.	Commencement Exercises, 10 A. M.
	16.	Meeting of Alumni.
	16.	Anniversary of Delta Phi Literary Society.

SUMMER VACATION.

FALL TERM.

Sept.	14.	Examinations for Admission, Tuesday, 10 A. M.
	15.	Fall Term begins Wednesday.

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President of the College.

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Courses of Study.

The courses of study in Delaware College are seven in number, as follows:

1. The *Classical*, leading to the degree A. B. (A.M.)
2. The *Latin-Scientific*, leading to the degree A. B. (A.M.)
3. The course in *Civil Engineering*, leading to the degree B. C. E. (C. E.)
4. The course in *Mechanical Engineering*, leading to the degree B. M. E. (M. E.)
5. The course in *Electrical Engineering*, leading to the degree B. E. E. (E. E.)
6. The course in *Agriculture and Science*, leading to the degree B. S. (M. S.)
7. A two years' Course in Agriculture, not leading to a degree.

Each of the first six of these courses is four years in length, and all are equal to similar courses in other high-grade colleges.

ADMISSIONS.

The following are the requirements for admission to the *Classical Course:*

Candidates for admission to the Freshman Class must be at least fourteen years of age, give satisfactory evidence of good moral character, and sustain an examination in the following studies, viz: *Orthography, Reading, Arithmetic, Geography, English Grammar, History of the United States, Physiology, Algebra through equations of the second degree, Plane Geometry, Latin and Greek Grammar, Greek Reader, First two Books of Xenophon's Anabasis, Part 1. Latin Reader, Sallust, Cæsar or Virgil, or what shall be deemed equivalent.*

The requirements for admission to the *Latin-Scientific Course* are the same as those for admission to the Classical Course, with the omission of Physiology and Greek.

The requirements for admission to the Course in *Agriculture and Science* and to the Courses in *Engineering* are the same as those for admission to the Latin-Scientific Course, with the omission of Latin.

The *Courses in Agriculture and Engineering* are established in accordance with an Act of Congress approved July 2d, 1862, and the Act of the General Assembly of the State of Delaware, passed March 14th, 1869, in which it is required, as the *leading object of the Agricultural College*, to teach such branches of learning as are related to agriculture and the mechanic arts, without excluding other scientific and classical studies, and including military tactics.

For admission to an advanced class of any of these courses, the applicant must also sustain an examination in the studies which have been pursued by the class which he seeks to enter.

DEGREES.

Students who have satisfactorily completed the *Classical* or the *Latin-Scientific* course will be entitled to receive the degree of Bachelor of Arts; those who have, in like manner, completed the course in *Agriculture and Science*, the degree of Bachelor of Science: those who have completed any of the courses in Engineering, the degree of Bachelor of Civil, Mechanical or Electrical Engineering, according to the course pursued. Every Bachelor of Arts who has prosecuted his studies for three years after graduation, and who is of good moral character, will be entitled to receive the degree of Master of Arts; and every Bachelor of Science who has, in like manner, prosecuted his scientific studies, and who is of good moral character, will be entitled to receive the degree of Master of Science.

Every candidate for graduation in any of the Engineering Courses is required, in addition to having pursued successfully the prescribed course of study, to present to the Professor in charge of his depart-

ment, on or before the first day of May next preceding the candidate's graduation, a carefully-prepared written description, accompanied by any necessary drawings, of some structure, machine, or process, which he may have examined; said description and drawings to be retained by the College as its property.

Each graduate of any of the courses in Engineering will, after three years' practical and successful work in his calling as an engineer, be entitled to his professional degree, M. E., C. E., or E. E., according to the course he may have pursued, on the presentation of proper evidence of having performed such work; but in the case of all advanced degrees, the candidate is required, as a condition precedent to the conferring of the degree, to write a satisfactory thesis, either literary, philosophical, or scientific, and submit the same to the President of the Faculty at least six weeks before the annual meeting of the Board of Trustees. Where a candidate applies for a master's degree in any of the departments of Engineering his thesis shall be on a topic related to his profession.

Courses of Instruction.

1. Classical Course.

Freshman Year.

First Term.—Rhetoric, 3; Algebra, 5; Latin, 5; Greek, 5; German, 2; Drill, 2.

Second Term.—Rhetoric, 3; Algebra and Geometry, 5; Geometrical Drawing, 2; Latin, 5; Greek, 5; German, 2;* Drill, 2.

Third Term.—Civics, 2; Geometry, 5; Geometrical Drawing, 2; Latin, 5; Greek, 5; German, 2; Drill, 2.

Sophomore Year.

First Term—Ancient History, 2; English Classics, 2; Trigonometry, and Surveying, 5; Latin, 4; Greek, 4; German or French, 2; Drill, 2.

Second Term—Mediæval History, 2; Study of Words, 2; Spherical Trigonometry and Conic Sections, 5; Latin, 4; Greek, 4; German or French, 2; Drill, 2.

Third Term—Modern History, 2; English Literature, 2; Analytical Geometry, 5; Latin, 4; Greek, 4; German or French, 2; Drill, 2.

Junior Year.

First Term—Psychology, 2; Inorganic Chemistry, 3; Analytical Geometry, 3; Physics, 3; Latin, 3; Greek, 3; German or French, 2; Drill, 2.

Second Term.—Psychology, 2; Logic, 2; Inorganic Chemistry, 3; Differential Calculus, 3; Physics, 3; Latin, 3; Greek, 3; German or French; 2; Drill, 2.

Third Term.—Moral Science, 2; Logic, 2; Inorganic Chemistry, 3; Integral Calculus, 3; Physics, 3; Latin, 3; Greek, 3; German or French, 2; Drill, 2.

Senior Year.

First Term—Natural Theology, 2; Political Economy, 2; Chemical Laboratory, 3; Sanitary Science, 1; Geology, 2; Integral Calculus, 2; Latin, 4; Greek, 3.

Note.—Students in the Classical Course pursue the study of German two years or French two years.

SECOND TERM.—Political Economy, 2; Chemical Laboratory, 3; Sanitary Science, 1; Geology, 2; Astronomy, 2; Latin, 4; Greek, 3.

THIRD TERM.—International Law or Constitutional Law, 2; Chemical Laboratory, 3; Sanitary Science, 1; Astronomy, 2; Latin, 4; Greek, 3.

2. Latin-Scientific Course.

Freshman Year.

FIRST TERM.—Rhetoric, 3; Physiology, 3; Zoology, 3; Algebra, 5; Latin, 5; German, 2*; Drill, 2.

SECOND TERM.—Rhetoric, 3; Botany, 3; Zoology, 3; Algebra and Geometery, 5; Geometrical Drawing, 2; Latin, 5; German, 2; Drill, 2.

THIRD TERM.—Civics, 2; Botany, 3; Geometry, 5; Geometrical Drawing, 2; Latin, 5; German, 2; Drill, 2.

Sophomore Year.

FIRST TERM.—Ancient History, 2; English Classics, 2; Inorganic Chemistry, 3; Botanical Laboratory, 4; Trigonometry and Surveying, 5; Latin, 4; German, 2; French, 2; Drill, 2.

SECOND TERM.—Mediæval History, 2; Study of Words, 2; Inorganic Chemistry, 3; Spherical Trigonometry and Conic Sections, 5; Latin, 4; German, 2; French, 2; Drill, 2.

THIRD TERM.—Modern History, 2; English Literature, 2; Inorganic Chemistry, 3; Analytical Geometry, 5; Latin, 4; German, 2; French, 2; Drill, 2.

Junior Year.

FIRST TERM.—Psychology, 2; Organic Chemistry, 3; Chemical Laboratory, 3; Mineralogy, 2; Analytical Geometry, 3; Physics, 3; Latin, 3; German, 2; French, 2; Drill, 2.

SECOND TERM.—Psychology, 2; Logic, 2; Organic Chemistry, 3; Chemical Laboratory, 3; Mineralogy, 2; Differential Calculus, 3; Physics, 3; Latin, 3; German, 2; French, 2; Drill, 2.

THIRD TERM.—Moral Science, 2; Logic, 2; Organic Chemistry, 3; Chemical Laboratory, 3; Mineralogy, 2; Integral Calculus, 3; Physics, 3; Latin, 3; German, 2; French, 2; Drill, 2.

Senior Year.

FIRST TERM.—Natural Theology, 2; Political Economy, 2; Sanitary Science, 1; Geology, 2; Integral Calculus, 2; French, 2; Latin, 4.

NOTE.—Students in the Latin Scientific Course pursue the studies of German and French each three years.

SECOND TERM.—Political Economy, 2; Sanitary Science, 1; Geology, 2; Astronomy, 2; French, 2; Latin, 4.

THIRD TERM.—International or Constitutional Law, 2; Sanitary Science, 1; Astronomy, 2; French, 2; Latin, 4.

3. Course in Civil Engineering.

Freshman Year.

FIRST TERM.—Rhetoric, 3; Physiology, 3; Algebra, 5; Lettering, 2; Instrumental Drawing, 2, *German, 2; Steam Engine, 2; Shop-work, 4; Drill, 2.

SECOND TERM.—Rhetoric, 3; Algebra and Geometry, 5; Mechanical Drawing, 6; Steam Engine, 2; German, 2; Shop-work, 6; Drill, 2. OPTIONAL.—Botany.

THIRD TERM.—Civics, 2; Geometry, 5; Steam Engine and Steam Boilers, 2; Descriptive Geometry and Drawing, 6; German, 2; Shop-work, 6; Drill, 2. OPTIONAL.—Botany.

Sophomore Year.

FIRST TERM.—English Classics, 2; Inorganic Chemistry, 3; Materials of Construction, 2; Plane Trigonometry, 5; Chain and Compass Surveying, 2; Elementary Mechanics, 3; Mechanical Drawing, 3; German or French, 2; Field-work and Plotting, 4; Drill, 2. OPTIONAL.—Botanical Laboratory.

SECOND TERM.—Study of Words, 2; Inorganic Chemistry, 3; Spherical Trigonometry and Conic Sections, 5; Transit Surveying and Leveling, 2; Building Construction, 2, Machine Drawing, 3; Elementary Mchanics, 3; German or French, 2; Orthographic Projection, 4; Drill, 2.

THIRD TERM.—English Literature, 2; Inorganic Chemistry, 3; Analytical Geometry, 5; City Surveying and Surveying of Public Lands, 2; Building Construction, 2; Elementary Mechanics, 3; German or French, 2; Orthographic Projection, 4; Field Work and Plotting, 4; Drill, 2.

Junior Year.

FIRST TERM.—Psychology, 2; Chemical Laboratory, 3; Mineralogy, 2; Physics, 3; Analytical Geometry, 3; Trigonometrical and Topographical Surveying, 2; Mechanics of Materials, 3; German or French, 2; Orthographic Projection, 4; Field-work, 2; Drill, 2.

SECOND TERM.—Psychology, 2; Chemical Laboratory, 3; Mineralogy, 2; Physics, 3; Differential Calculus, 3; Hydrographic and Mine Surveying, 2; Mechanics of Materials, 3; German or French, 2; Drawing, 8; Drill, 2.

NOTE.—Students in the Engineering Courses pursue the study of German at least three years or the study of French at least two years.

THIRD TERM.—Chemical Laboratory, 3; Mineralogy, 2; Physics, 3; Integral Calculus, 3; Geodetic Surveying, 2; Mechanics of Materials, 1; Mechanics of Solids, 2; German or French, 2; Drawing, 4; Field-work, 6; Drill, 2.

Senior Year.

FIRST TERM.—Political Economy, 2; Sanitary Science, 1; Geology, 2; Calculus, 2; Roofs and Bridges, 3; Mechanics of Materials, 1; Mechanics of Solids, 2; Masonry Construction, 2; Railroad Location and Construction, 2; Drawing, 2; Field work, 6.

SECOND TERM.—Political Economy, 2; Sanitary Science, 1; Geology, 2; Roofs and Bridges, 3; Masonry Construction, 2; Highway Construction, 2; Hydromechanics, 3; Drawing, 4; Engineering Laboratory, 4.

THIRD TERM.—International or Constitutional Law, 2; Sanitary Science, 1; Roofs and Bridges, 4; Hydromechanics, 3; Specifications and Contracts, 1; Water Supply and Sewerage, 3; Engineering Laboratory, 3; Drawing, 4; Field-work, 6.

4, 5. Courses in Mechanical and Electrical Engineering.

Freshman Year.

FIRST TERM.—Rhetoric, 3; Algebra, 5; Lettering, 2; Instrumental Drawing, 2; Steam Engine, 2; Physiology, 3; German, 2; Shop-work, 4; Drill, 2.

SECOND TERM.—Rhetoric, 3; Algebra and Geometry, 5; Mechanical Drawing, 6; Steam Engine, 2; German, 2; Shop-work, 6; Drill, 2.

THIRD TERM.—Civics, 2; Geometry, 5; Descriptive Geometry and Drawing, 6; Steam Engine and Steam Boilers, 2; German, 2; Shop-work, 6; Drill, 2

Sophomore Year.

FIRST TERM.—English Classics, 2; Inorganic Chemistry, 3; Plane Trigonometry, 5; Elementary Mechanics, 3; Mechanical Drawing, 3; French or German, 2; Shop-work, 6; Drill, 2.

SECOND TERM.—Study of Words, 2; Inorganic Chemistry, 3; Spherical Trigonometry and Conic Sections, 5; Mechanical Drawing, 3; Elementary Mechanics, 3; French or German, 2; Shop-work, 6; Drill, 2.

THIRD TERM.—English Literature, 2; Inorganic Chemistry, 3; Analytical Geometry, 5; Elementary Mechanics, 3; Kinematics, 3; French or German, 2; Shop-work, 6; Drill, 2.

Junior Year.

First Term.—Psychology, 2; Chemical Laboratory, 3; Analytical Geometry, 3, Physics, 3; Kinematics, 3; Mechanics of Materials, 3; Valve Gears, 2; French or German, 2; Shop-work, 3; Drill, 2.

Second Term.—Psychology, 2; Chemical Laboratory, 3; Differential Calculus, 3; Physics, 3; Kinematics, 1; Mechanics of Materials, 3; Valve Gears, 2; Graphical Statics of Mechanism, 1; French or German, 2; Shop-work and Mechanical Laboratory, 3; Drill, 2.

Third Term.—Integral Calculus, 3; Physics, 3; Mechanics of Solids, 2; Mechanics of Materials, 1; Graphical Statics of Mechanism, 4; Theory of Electricity, 3; French or German, 2; Shop-work and Mechanical Laboratory, 6; Drill, 2.

Senior Year—Mechanical Engineering.

First Term.—Political Economy, 2; Integral Calculus, 2; Roofs and Bridges, 3; Mechanics of Materials, 1; Steam Engine Design, 3; Machine Design, 2; Thermodynamics, 4; Shop-work and Mechanical Laboratory, 4.

Second Term.—Political Economy, 2; Steam Engine Design, 3; Boilers, 3; Hydromechanics, 3; Gas Engines, 1; Dynamo Electric Machinery, 2; Mechanical Laboratory, 4.

Third Term.—International or Constitutional Law, 2; Boilers, 2; Pumps and Hydraulic Motors, 3; Special Machine Design 2; Transmission of Power, 2; Hydromechanics, 3; Mechanical Laboratory (Thesis) and Shop-work, 3.

Senior Year—Electrical Engineering.

First Term —Political Economy, 2; Integral Calculus, 2; Steam Engine Design, 3; Thermodynamics, 4; Electrical Measurements, 1; Direct Current Dynamo Electrical Machinery, 4; Shop-work and Electrical Laboratory, 4.

Second Term.—Political Economy, 2; Boilers, 3; Hydromechanics, 3; Electrical Measurements, 2; Storage Batteries, 2; Alternating Current Machinery, 3; Mechanical and Electrical Laboratory, 4.

Third Term.—International or Constitutional Law, 2; Hydraulic Motors, 3; Electric Lighting and Transmission of Power, 5; Electrical Machine Design, 2; Hydromechanics, 3; Electrical Laboratory (Thesis) and Shop-work, 3.

6. Course in Agriculture and Science.

Freshman Year.

First Term.—Rhetoric, 3; Physiology, 3; Algebra, 5; Zoology, 3; Agriculture, 2; Free-Hand Drawing, 2; Shop-Work; * One *Elective*, (German, 2, or Latin, 5.)

Second Term.—Rhetoric, 3; Botany, 3; Algebra and Geometry, 5; Instrumental Drawing, 2; Zoology, 3; Agriculture, 3; Shop-work; One *Elective*, (German, 2; or Latin, 5.)

Third Term.—Civics, 2; Botany, 3; Geometry, 5; Instrumental Drawing, 2; Agriculture, 3; Show-work or Laboratory; One *Elective*, (German, 2, or Latin, 5.)

Sophomore Year.

First Term.—English Classics, 2; Ancient History, 2; Inorganic Chemistry, 3; Botanical Laboratory, 4; Trigonometry and Surveying, 5; Agriculture, 2; Two *Electives*, (German, 2; French, 2; Latin, 4.)

Second Term.—Study of Words, 2; Mediæval History, 2; Inorganic Chemistry, 3; Botanical Laboratory, 4; Spherical Trigonometry and Conic Sections, 5; Horticulture, 3; Two *Electives*, (German, 2; French, 2; Latin, 4.)

Third Term.—English Literature, 2; Modern History, 2; Inorganic Chemistry, 3; Botanical Laboratory, 4; Analytical Geometry, 5; Agriculture, 2; Two *Electives*, (German, 2; French, 2; Latin, 4.)

Junior Year.

First Term.—Psychology, 2; Organic Chemistry, 3; Mineralogy, 2; Chemical Laboratory, 3; Physics, 3; Agriculture, 4; Two *Electives*, (German, 2; French, 2; Latin, 3.)

Second Term.—Psychology, 2; Organic Chemistry, 3; Chemical Laboratory, 3; Mineralogy, 2; Physics, 3; Mycology, 2; Horticulture and Landscape Gardening, 3; Two *Electives*, (German, 2; French, 2; Latin, 3.)

Third Term.—Moral Science, 2; Organic Chemistry, 3; Chemical Laboratory, 3; Mineralogy, 2; Physics, 3; Agriculture, 3; Two *Electives*, (German, 2; French, 2; Latin, 3.)

Senior Year.

First Term.—Political Economy, 2; Sanitary Science, 1; Geology, 2; Agriculture, 5; Chemical Laboratory, 3; Two *Electives*, (German, 2; French, 2; Latin, 4.)

*Note.—Students in the Course in Agriculture and Science pursue the study of one Language four years and of another three years. They are required to take one elective in the Freshman and two electives in each of the other years

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THE DRAUGHTING ROOM.

SECOND TERM.—Political Economy, 2; Sanitary Science, 1; Geology, 2; Veterinary Science, 4; Entomology, 5; Two *Electives*, (German, 2; French, 2; Latin, 4.)

THIRD TERM.—International or Constitutional Law, 2; Sanitary Science, 1; Stock Farming, 5; Meteorology, 1; Two *Electives*, (German, 2; French, 2; Latin, 4.)

7. Shorter Course in Agriculture.

First Year.

FIRST TERM.—Rhetoric, 3; Inorganic Chemistry, 3; Physiology, 3; Algebra, 5; Zoology, 3; Farm Economy, Farm Appliances and Machinery, 4.

SECOND TERM.—Rhetoric, 3; Inorganic Chemistry, 3; Botany, 2; Algebra and Geometry, 5; Entomology, 4; Farm Crops and Soils, 4.

THIRD TERM.—Civics, 2; Inorganic Chemistry, 3; Botany, 2; Geometry, 5; Stock Breeding, 4; Breeds of Live Stock, 3.

Second Year.

FIRST TERM.—English Classics, 2; Organic Chemistry, 3; Sanitary Science, 1; Botany, 4; Manures and Fertilizers and their Use, 4; Stock Feeding and Dairying, 2.

SECOND TERM.—Study of Words, 2; Organic Chemistry, 3; Sanitary Science, 1; Plant Diseases, 2; Horticulture, 4; Veterinary Science, 3.

THIRD TERM.—English Literature, 2; Organic Chemistry, 3; Sanitary Science, 1; Plant Diseases, 2; The Composition and Structure of Plants, 4; Veterinary Science, 3.

NOTE.—Shop-work throughout at least one year.

NOTE.—Wherever the figure 2 occurs in connection with *Drill*, it should read 3.

Military drill is compulsory also in the first three years of the Course in Agriculture and Science.

Methods of Instruction.

English Language and Literature.

The studies in this department consist of Rhetoric, the Study of Words, English Classics, and English Literature. In the study of Rhetoric proper, practice is united with theory, and ample exercise is given to the students in selection, criticism and construction.

In English Classics the student is trained to give a thorough analysis and criticism of some of the masterpieces of both British and American authors, thus making a practical application of the principles of grammar and rhetoric previously studied.

In rhetorical exercises, the Freshman class is limited to declamations and essays; the Sophomore, to essays and arguments; the Junior, to arguments and orations; the Senior, to orations.

Mental, Moral and Political Science.

The methods presented in these studies consist mainly of oral and written discussions of the topics included in the daily work, together with lectures as occasion may demand. Special encouragement is given to original investigation on the part of the student.

Chemistry, Mineralogy, Geology and Sanitary Science.

Instruction is given in Pure and Applied Chemistry by lectures, recitations, and laboratory practice. This course extends through the Sophomore, the Junior, and the Senior year, and embraces the elements of Inorganic and of Organic Chemistry. Students, after making themselves familiar with the details of experiments, are required to repeat the same in the laboratory.

The chemical laboratory is open daily for instruction in analytical chemistry.

The course in qualitative analysis includes the examination of simple and complex substances in the wet way, their analysis by the use of the blow-pipe and flame reactions, and the determination of minerals with the blow-pipe.

Students are required to keep a careful record of their work, and submit the same to the inspection of the Professor. Upon passing satisfactory examination in qualitative analysis, students may, if they so desire, take up quantitative analysis.

The course of instruction in quantitative analysis includes the examination of simple and complex salts, minerals, ores, ashes of plants, fertilizers, water, etc , by the gravimetric and the volumetric methods.

In order to make the instruction as *practical* as possible, lectures upon the leading *Chemical Industries* will be given throughout the entire course.

Assaying.—The assay laboratory is kept in full working order, completely furnished with crucible, scorification and cupelling furnaces, and everything necessary for practical work in the assay of ores of lead, silver, gold, etc. The general principles as well as special methods of assaying are explained in the lecture room, and at the same time ores of the various metals are exhibited and described. From a collection of these ores from various parts of the country, the students are required to make a number of assays under the immediate supervision of the Professor.

Mineralogy.—The course of instruction in Mineralogy extends throughout the Junior year. The first term is usually occupied with the discussion of the *Physical Properties* of minerals, including their morphological properties (Crystallography), their optical properties, hardness, specific gravity, etc. The second and the third term are devoted to Descriptive Mineralogy. Students also receive practical instruction in Determinative Mineralogy.

Geology.—The work in this department comprises recitations and lectures upon General Geology throughout two terms of the

Senior year. The student is first taught the principles of Lithology and of Microscopic Petrography. For this work the College has provided itself with the best Petrograpical Microscopes and sets of hand specimens and thin sections of the typical rocks. The study of Structural and Dynamical Geology occupies the second term of the Senior year, when the student is taught the arrangement of rock masses, and the agencies concerned in their upheaval, erosion and metamorphism.

Sanitary Science.—The instruction in this important study is thoroughly practical, and embraces recitations and lectures on the following subjects: Water, Air, and Food; Sewerage; Disposal and Utilization of Sewage; Origin and Spread of Epidemic; Disinfectants and their Uses; Ventilation and Warming; Vital Statistics, etc.

Library.—The library of the department is well supplied with the leading standard works on Chemistry, Mineralogy, Geology and Sanitary Science. The following journals are on file in the department library: American Journal of Science; Popular Science Monthly; The Sanitarian; Journal of the London Chemical Society; Proceedings of the Royal Society; Proceedings of the Royal Institution; Engineering and Mining Journal; Journal of the Society of Arts, London; Zeitschrift f. Krystallographie und Mineralogie; Deutsche Vierteljahrsschrift f. offentliche Gesundheitspfleg; Neues Jahrbuch f. Mineralogie, Geologie und Paleontologie; Tschermak's Mineralogische und Petrographische Mittheilungen; Myer's Jahrbuch der Chemie; Jahres-bericht f. Hygiene.

Mathematics.

For entrance, a thorough acquaintance with the elementary operations of Algebra, Factoring, Involution and Evolution, Radicals, Fractional and Negative Exponents, Simple and Quadratic Equations, is required. Candidates should possess the power of ready and accurate performance in the use of ordinary algebraic processes.

A good knowledge of Plane Geometry as given in Wentworth's, Wells', Chauvenet's, or other text-books of like grade, is necessary

for the profitable undertaking of the mathematical work of the College.

A short general review of Elementary Algebra and Plane Geometry is given in the College, but the main part of the Freshman year is occupied with the completion of the course in Algebra, including Ratio, Proportion, Variation, Arithmetical and Geometrical Progressions, Permutations and Combinations, Binomial Theorem, Logarithms, Summation of Series, Theory of Equations, Solutions of Higher Equations, etc., and with Solid Geometry and the Mensuration of Solids.

Throughout the year original exercises in demonstration and solution are given.

In the Sophomore year Plane and Spherical Trigonometry are finished, and the Conic Sections are studied by purely geometrical as well as by analytical methods.

Early in the Junior year the course in Analytical Geometry is completed and the remainder of the year is given to the Differential and Integral Calculus.

Throughout the first term of the Senior year an advanced course in the applications of the Calculus is pursued. In the second and the third term of the Senior year instruction is given in Astronomy, Young's General Astronomy being the text-book used.

Physics.

Instruction in Physics is given by recitations, lectures and experimental demonstrations. The text book used is *Atkinson's Ganot's Physics*. The first term is given to the study of the Laws and Properties of Matter, Sound and Heat. After the subject Heat has been finished, Magnetism and Frictional Electricity are studied in the second term. In the third term Dynamical Electricity and Light are the subjects of study.

Juniors in the Electrical Engineering course have, in addition, three recitations a week during the third term in the Theory of Electricity.

The Physical Department is well equipped with new apparatus, covering the various lines of work in the subject. Many instruments of precision have been recently added.

The Department of Physics and Mathematics possesses a valuable library, to which additions are constantly made, keeping it fully abreast with the most recent advances in scientific activity.

Among the journals that are regularly received are The Philosophical Magazine, The Physical Review, Zeitschrift f. Physikalischen und Chemischen Unterricht, Zeitschrift f. Instrumentenkunde, Poggendorff's Annalen Nature, The Astro-physical Journal, Popular Astronomy, Scientific American Supplement, Mathematical Gazette, Bulletin of the American Mathematical Society.

Students have access to the Library at all times during College hours.

Latin and Greek.

In the Classical and the Latin-Scientific Course the study of Latin is pursued four years. The following is the work in Latin required for graduation in the Latin-Scientific Course: A *First Book in Latin* (Tuell & Fowler), a review; *Cæsar*, two books, a review: *Virgil*, 2500 lines; *Cicero*, Catalinian Orations and Archias; *Ovid*, Phaethon, Orpheus, and Eurydice, Flight of Daedalus, etc.; *Horace*, 35 Odes, Satires 1 and 9 of the First Book; *Tacitus*, Germania and Agricola, 100 pages of choice selections from *Livy*, *Juvenal*, *Seneca*, and other authors; Allen's *Short History of the Roman Empire: Mythology; Geography of Greece and Italy; Supplementary Reading*

Allen and Greenough's Latin Grammar is used for study and reference.

The Latin of the Classical Course is the same as the foregoing, with the addition of Cicero's Senecute, the 21st Book of Livy, and additional reading in Horace, Virgil and Juvenal.

By resolution of the Trustees, no student will hereafter be admitted to the Classical Course who is not able to comply with the requirements in Latin for admission to the College.

The work in Greek in the Classical Course consists of *Greek Primer* (Frost); *Xenophon*, Anabasis (2 books), Memorabilia; *Plato*, Phaedo; *Demosthenes*, 3d Olynthiac and 1st Phillippic; *Homer*, Books 1, 9, 11 of the Odyssey and Book 1 of the Iliad; *Aeschylus*, Prometheus Bound; 100 pages of selections from *Euripides*, *Aristophanes* and *Thucydides; History of Greece* (Pennell's); *Geography of Greece and Italy; Greek Testament; Mythology; Supplementary Reading.*

Goodwin's Greek Grammar is used for study and reference.

German.

The course in German is designed to give such a knowledge of the principles of the language and such a vocabulary as will enable students to translate readily. Whitney's Grammar with Exercises is made the basis of instruction. Ample practice in translation is afforded by reading the best class of German fiction, history and dramatic works.

French.

The study of French begins in the Sophomore year and continues three years, two hours per week.

The aim is to give the student the ability to read modern French readily.

The elementary principles of grammar and pronunciation are taught in the first year in connection with a text book. In the next two years various French texts are used, selected from the writings of the best authors, in order to give as wide an acquaintance as possible with the idioms of the language. During the past year the classes have read Molier's "L'Avare," Loti's "Pecheur d'Island," several of Daudet's short stories and Hugo's "Quartre vingt-treize."

Biology.

Human Anatomy and Physiology.—Martin's "*The Human Body*" (Briefer Course) is used as a text-book during the first term

of the Freshman year; all students except those in the Classical Course being required to take this study three times a week.

It is intended to give the student a knowledge of the different bones and organs of the body, of the tissues composing them, the functions of the organs, the processes of digestion and nutrition, with some elementary facts connected with hygiene and the nutritive value of foods.

Zoology.—The work in Zoology takes three hours a week during the first and the second term of the Freshman year, in the Latin-Scientific and the Agricultural Course. One half of the time is given to laboratory work, typical specimens illustrating the different classes of animals being critically examined by each student, as to both external form and internal structure.

This work is supplemented by text-book study of comparative anatomy and physiology. In this way a somewhat comprehensive survey is taken of the various forms found in the Animal Kingdom and the differences in structure in proceeding from lower to higher forms are impressed upon the mind. Written descriptions made from the laboratory notes, are required after each dissection.

Botany.—The larger part of the work in this department is done in the laboratory.

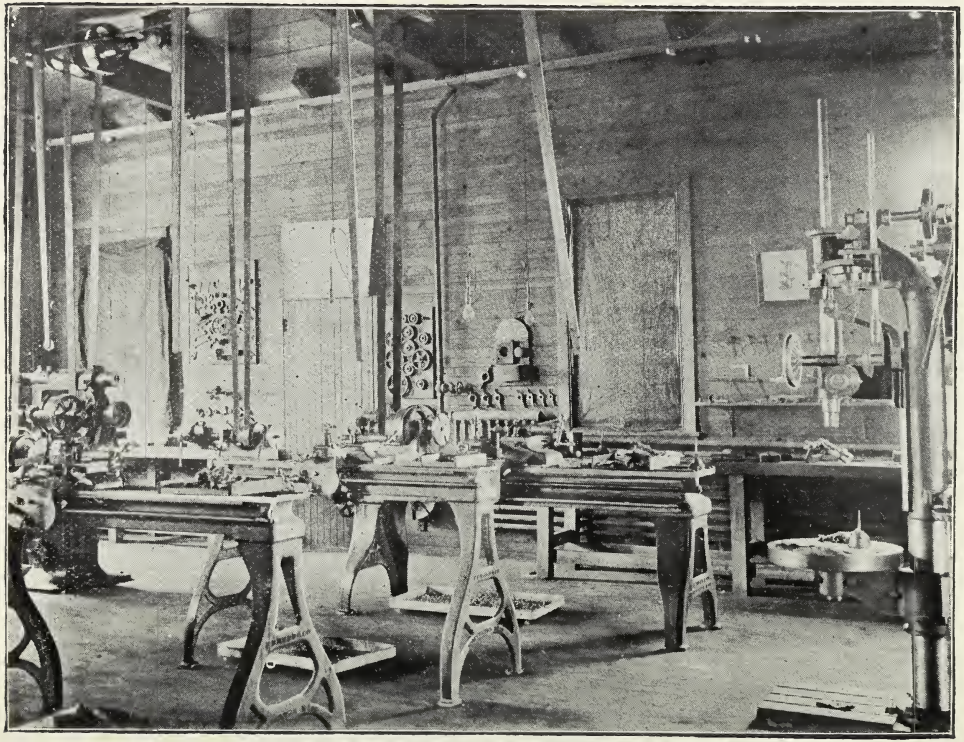
Text books are used rather as books of reference than as the main source of knowledge.

Beginning with the second term of the Freshman year three or four periods a week for the whole of one college year are given to studying plants in their varied forms.

The laboratory is provided with compound microscopes and the students begin to use them in the first part of the course.

Familiarity with cell-structure and the various tissue systems is soon acquired and the student prepared for more advanced work in plant dissection, which is taken up in the Agricultural Course.

The gross anatomy of the flowering plants receives special attention during the Spring term. By requiring written descriptions of common plants, followed by identification by means of the analytical



THE MACHINE SHOP.

LIBRARY
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key, a habit of close observation is cultivated and the student is given some knowledge of the natural objects around him.

Acquaintance with the lower forms of plant life is given through the examination of such typical species as are easily obtainable.

The differences in structure which make classification possible are made plain, and the various phenomena connected with reproduction are noted as met with.

Students in the Latin-Scientific and the Agricultural Course take the first year's work in Botany and those in the latter course two terms additional.

Entomology.—Students in the Agricultural Course receive instruction in Entomology during the Senior year. This subject is made largely practical. The relation of insects to organic life and the interests of man is made especially prominent. A knowledge of structural entomology is gained by discussion and detailed study of typical insects. Special stress is laid upon the economic relation of insects to plant life. Opportunity is given for practice in field observation, and the ordinary methods of collection and care of specimens is taught, special attention being devoted to the means of controlling the ravages of noxious species and protecting those that are beneficial.

Horticulture.—The grounds of the Experiment Station connected with the College afford ample opportunity for practical as well as theoretical teaching in this branch. Methods of propagation, including grafting, budding, layering, and also pollination and hybridizing, are considered. The management of hot-beds, cold-frames, and culture under glass are included in the course of instruction. A vineyard of over 100 varieties of grapes gives ample scope for the study of viticulture, and the cultivation of leading fruits and vegetables is made prominent.

Civil Engineering.

During the whole of the Freshman year students in this department receive instruction in the class-room and the shops. During

the other years of the course they are engaged in class-room, field, office and laboratory work.

The aim of the instruction is to impart a knowledge of the principles underlying the several branches of Civil Engineering, and to fit the students to apply them intelligently in practice.

Special attention is given to the development of those lines of study bearing upon construction. Throughout the course originality on the part of the student is encouraged.

As important aids in securing the development of correct methods of observation and description stress is laid upon the value of visits of inspection to structures and works, and especially upon the description required from each member of the Senior class, of some structure, machine or process which he has visited and inspected.

Technical studies previously named in the courses of instruction include in the several years of this course the work outlined as follows :

Steam Engine and Steam Boilers in the Freshman year, text-book work and lectures.

Shop-work in the Freshman year, bench-work in wood and in iron, wood turning and management of engines and steam boilers.

Surveying in the Sophomore and the Junior year, text-book work.

Masonry Construction, Railroad Location and Construction, Highway Construction and Maintenance, Water Supply and Sewerage and Specifications and Contracts in the Senior year, lectures and text-book work.

Field-work in the Sophomore year, land surveying with chain, tape, compass and transit, and elementary operations in leveling; in the Junior year, topography with transit, level, stadia and plane table; in the Senior year, railroad surveying.

Materials of Construction and Building Construction in the Sophomore year, the sources, nature and properties of the materials commonly used in construction and the principal operations involved in the construction of buildings.

Theoretical Mechanics in the Sophomore year, an elementary general course; in the Junior and the Senior year, an advanced course.

Applied-Mechanics in the Junior year, strength of materials and of beams, columns and shafts; in the Senior year, deflection of beams, stresses in framed structures, analytic and graphic methods, and hydraulics.

Engineering Laboratory in the Senior year, testing of materials of construction and practical hydraulics.

Drawing in the Freshman year, lettering for working drawings, use of instruments, geometrical constructions, instrumental copying of machine details, descriptive geometry, perspective and isometric drawing; in the Sophomore year, working drawings from sketches, tracings and blue-prints from the drawings, free-hand sketches from actual machines, working drawings from the sketches, orthographic projection, and plotting from field notes of surveys; in the Junior year, orthographic projection, plotting from field-notes, tinting and shading, and designing of static structures; in the Senior year, plotting from field-notes, and designing of static structures.

The Trustees have supplied this department with an outfit of excellent instruments for both field and office work, a testing machine by the best makers for the engineering laboratory, a file of the leading professional periodicals, and a department library of standard works on civil engineering to which additions are constantly being made.

On a preceding page is given information regarding the degrees conferred in this course.

Mechanical and Electrical Engineering.

The courses in Mechanical and Electrical Engineering are intended to prepare young men to design, construct and supervise machinery and electrical apparatus.

Instruction is given by recitations, lectures and practical work in shops and laboratories. The class-room work in each subject is based upon a text-book and is made extremely practical, the student being required to apply continually the principles studied to prob-

lems and to the criticism of existing, and the designing of new machines, the aim being to train men to unite correct theory with practical requirements. To accomplish this fully, much stress is laid on proficiency in the actual management and care of apparatus, about one-third of the whole time being devoted to practical work.

The different studies, with the time assigned to each, are set forth in the schedule of the courses. A circular, issued by the Department and fully describing the studies and laboratory work, will be sent upon application to the President of the College or to the Professor of Mechanical and Electrical Engineering.

The apparatus belonging to the Department is being rapidly increased, and the equipment is sufficient to allow the new courses in Mechanical and Electrical Engineering to be carried out in full.

For purposes of testing, there have been added a twenty-five horse-power boiler with pump and injector, a 7x10 automatic high-speed steam engine and a 6½ kilowatt dynamo. This apparatus has been selected and placed with direct reference to its utility for purposes of instruction and experiment. The boiler may be fed by either pump or injector, and the dynamo is so constructed that it may be run either shunt, series, or compound. A full complement of measuring instruments is provided, together with lamps for full load, so arranged that any desired number may be thrown on at will.

For further experiment there are a small steam engine built by students and used exclusively for valve setting experiments and elementary practice with indicator and brake, a 13-horse-power gasoline engine and the boiler of the college heating-plant, together with indicators, brakes, calorimeters, etc., for engine and boiler testing.

For electrical laboratory work the apparatus of the Department of Physics is available, together with considerable special apparatus belonging to this Department, the more prominent pieces being Ayrton and Perry's secohmmeter and standard of self induction, standard ammeter and voltmeter from Weston and a 40-cell storage battery.

A motor and a machine for testing the materials of construction have been added during the year.

The equipment for work in wood comprises six benches with vises and sets of tools for carpentry and pattern-making, a power rip-saw, a mortising-machine and six wood-lathes with sets of turning tools. The machine shop is equipped with three screw-cutting engine-lathes, a milling-machine, a planer, two drill presses, benches, vises, sets of tools for work in metal, sets of taps and dies, tools for forge-work in iron and very many minor appliances.

The Department possesses a working library of standard works on Mechanical and Electrical Engineering and the Mechanic Arts. The current numbers of London Engineering, American Machinist, Scientific American, Electrical World, Electrical Engineer, L'Electricien and Patent Office Gazette are kept where they are at all times accessible to students.

Through the kindness of many manufacturing firms the Department possesses working drawings of machine tools, engines, boilers, plants, etc., together with a very full set of trade catalogues and pamphlets.

By reason of the favorable situation of the College, frequent visits to the engineering establishments of Philadelphia, Wilmington, Chester and Baltimore are made possible, and the Department is enabled to keep in close touch with the actual engineering work

Agriculture.

Three distinct courses in Agriculture are now offered: namely, a Short Winter course, beginning on the first Wednesday in January and continuing three months, a Two Years' Course and a complete Four Years' Course leading to a degree.

The Short Winter Course is designed to give special instruction in Agriculture and its related sciences to such young men as intend to be farmers, who are interested in learning some of the principles underlying their work, but who feel that they cannot give the time necessary for a complete education. This course is coincident with the regular Winter Term of the College, and the subjects taught the students in this course are so far as possible taught in the same manner as in the regular college classes. At least fifteen hours per

week of attendance on recitations or lectures are required of each student, the time being devoted to Agriculture, Horticulture, Botany, Entomology, Veterinary Science and Animal Husbandry. A circular giving fuller details of this course will be sent upon application.

The Two Years' Course is intended for those who wish, in addition to the principles of Agriculture, the foundation of a good English education. An examination of the requirements of this course will show that time of the student is taken up with those studies which have a direct practical bearing upon his future life as a farmer and as a citizen.

The Four Years' Course, upon the completion of which the student receives the degree of B. S., is parallel with the other technical and scientific courses of the College.

This course offers the advantages of a collegiate education in connection with a thorough training in agriculture and the sciences related to it. Young men completing it are prepared to take charge of large farms, or take positions in Experiment Stations or elsewhere, where educated men with special knowledge of agriculture and science are needed.

The scope of the work in this Course and in the Two Years' Course is fully set forth in the schedule of studies.

Delaware College Agricultural Experiment Station.—The report of this station as a department of Delaware College is issued soon after the first of February, and, as required by the Hatch Act and the Land Grant Act of 1862, a copy of the report is sent to the Secretary of the Interior, to the Secretary of Agriculture, and to every Agricultural College in the country. The work of the College in applied agricultural science is explained in detail in that report, to which all who are interested in the work of the College in this department are respectfully referred.

Military Science and Tactics.

By the Act of Congress, July 2d, 1862, establishing colleges for the benefit of Agriculture and the Mechanic Arts, military science

and tactics become a part of the work of instruction. All students not in the Senior class are required to take military instruction and drill, unless specially excused by the Faculty on account of physical disability or because of conscientious scruples on the part of their parents.

In Delaware College the military instruction and drill are in charge of an officer of the regular army. The course of instruction is both theoretical and practical.

The theoretical instruction, one hour a week, is confined to the winter term.

The first year's course consists of the Drill Regulations of the three arms of the U. S. Army, so far as each pertains to the practical instruction given in that arm.

The second year's course embraces "Notes on Military Science and the Art of War," and the preparation of the usual reports and returns pertaining to a company.

Lectures on military subjects are delivered throughout the year to those taking the course.

PRACTICAL INSTRUCTION EMBRACES

1. *Infantry.*—The School of the Soldier, the Company and the Battalion, including the ceremonies of guard mounting, dress parade, reviews, and inspections.

2. *Artillery.*—The School of the Soldier dismounted, manual of the piece, etc.

3. *Signaling.*—Transmission of messages by means of the flags and the heilograph.

The National Government supplies all arms, ammunition and equipments; and the College, all military text-books. The only expense incurred by the student in taking this course is his uniform. The uniform adopted is a cadet gray,—strong, neat and serviceable,—costing from $13.50 to $16.50.

General Remarks.

LOCATION OF THE COLLEGE.—Delaware College is located at Newark, a quiet and cultured town in the northwestern part of

Delaware and within two miles of either Maryland or Pennsylvania. The surrounding country is beautiful and the climate healthful.

The College enjoys the advantage of being situated at the head of the peninsula formed by Chesapeake Bay and Delaware Bay, at the point where the communication is constant with Washington, Baltimore, Wilmington, and Philadelphia, by either the Philadelphia, Wilmington and Baltimore Railroad or the Baltimore & Ohio, and with all portions of Delaware and the Eastern Shore of Maryland and Virginia by the Delaware Railroad and its numerous branches. The Pennsylvania & Delaware Railroad also passes through Newark.

Recent Improvements.—The Trustees have lately purchased for athletic and other purposes, nine acres of land adjoining the college grounds on the east. They have also, under the direction of a competent landscape gardener, greatly improved the campus.

The Delaware College Agricultural Station is located on the college grounds. A brick structure, two stories in height, has been erected as the Experiment Station for the State.

The building contains the requisite laboratories for the experimental work of the station, and is completely equipped with all the necessary apparatus, machinery, literature, etc., to make it one of the best of its kind.

A frame building, 40x60 feet, has been erected as a gymnasium and drill hall.

Over $40,000 has been expended during the past few years in the purchase of apparatus and libraries for the College.

A new brick building, 97x50 feet, and three stories in height, has been erected, at a cost of $23,000. This building is devoted wholly to recitation-rooms, draughting-rooms, an auditorium, an assembly-room, laboratories, and the President's office.

A new wood-working shop, 34x52 feet, and two stories high, has also lately been erected. The first story of this building serves as tool room, blacksmith shop, testing room and boiler house. The steam boiler used to heat all the college buildings and shops is located in the basement of this building; the second story contains the wood-working shops.

A SECTION OF THE PHYSICAL LABORATORY.

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The former wood-working shop, 30x52 feet, has been converted into a machine shop.

The shops are now fully equipped for giving the necessary practical instruction in the mechanic arts.

Apparatus—The supply of physical and chemical apparatus has been greatly increased, and it is fully adequate for all purposes of illustration.

The geological and mineralogical collections are sufficient for all class and laboratory purposes. The chemical and biological laboratories are newly fitted and well adapted for work.

Further additions will be made to the appliances of the College as rapidly as the advancement of science may require.

EXPENSES.

	First Term.	Second Term.	Third Term.
Tuition	$24.00	$18.00	$18 00
Fuel for Oratory and Recitation Rooms	1.00	.75	.25
Janitor's fee for care of Recitation Rooms, etc	1.50	1.25	1.25
Use of Library	1.00	.75	.75
Incidental Expenses	1.00	.75	.75
Total for Students not rooming in College	$28.50	$21.50	$21.00
For those having Free Scholarships	4.50	3.50	3.00

EXTRA FOR STUDENTS ROOMING IN THE COLLEGE.

Room Rent	$4 00	$3.00	$3.00
Heat for Rooms	4.00	3.00	1.00
Janitor's Wages for Care of Rooms	1.50	1.25	1.25
Total for Students rooming in the College	$38.00	$28.75	$26.25

The charges for Tuition are remitted to such students as receive State Scholarships.

In addition to the foregoing charges, each student, upon entering the College, will pay $5.00 as an entrance fee.

Students in Chemistry are charged a fee of $2.50 a term for such articles as are consumed in making experiments.

The students rooming in the College dormitory have formed an association, in which board is furnished at less than $3.00 a week.

Room furniture, including bedstead, mattress, bolster, washstand, study-stable and chairs is rented to students at the rate of $3.00 a year for the use of the furniture when two room together, or $5.00 a year when the student rooms alone. Students may furnish their own rooms if they prefer. They provide for themselves lights, books, and stationery.

PAYMENT.—College dues must be paid in advance each term, and the Treasurer's receipt must be exhibited to the President before the student is admitted to his recitations. Students who enter before the middle of the term will be charged with full tuition, room-rent, and other items, for the term; when entering at or after the middle of the term, with one-half such tuition, room-rent, etc.

If a student be removed from the College by the Faculty, or by sickness or casualty, before the middle of a term, the money paid for the latter half will be refunded; otherwise not.

Damages are assessed on the perpetrators if discovered; otherwise on all students.

All arrearages must be paid or provided for before a graduating student receives his diploma.

STATE STUDENTS.—By the provisions of the Act of Assembly of 1869 and its supplements, each county in the State is entitled to have ten students educated at the College, free of charge for tuition.

The members of the Legislature are vested with authority to make these appointments; each member having the right, in effect, to make one nomination, until the vacancies are filled. The same qualifications in regard to scholarship and character are required of these as of other candidates for admission to the College, except that by the State laws the candidates must be at least sixteen years of age.

A late resolution of the Board of Trustees makes tuition free to all students from Delaware.

CHOICE OF STUDIES.—Students may, with the approval of their parents or guardians, enter any one of the departments; or they may take such select studies as circumstances render advisable, but a regular course is strongly recommended.

Those who wish to make a specialty of Chemistry have peculiar advantages for practical work in Qualitative and Quantitative Analysis, in the Chemical Department of the College, which is, by legislative enactment, the State Laboratory of Delaware

Changes from one course to another may be made only at the opening of the term, with the approval of the Faculty.

Every student is required to have at least fifteen recitations, or their equivalent, weekly, unless specially excused for cause.

Rooms.—Students are required to occupy such rooms as may be assigned to them by the President, and are not allowed to remove without his permission.

A student who does not return punctually at the beginning of the term forfeits his room, and he cannot resume his place in his class unless he presents a satisfactory excuse from his parent or guardian and sustains an examination in the studies pursued by the class during his absence The same rule applies to such as lose a part of their course by absence during the term unless excused by the Faculty.

Examinations.—At the close of each term the members of the classes are examined by the Faculty. At the close of the year the students are examined in the presence of a Committee, and their attainments are communicated to the Board of Trustees.

Honors.—In the assignment of the final honors of the graduating class the four-year courses are of equal rank.

Societies.—There are two Literary Societies, the Athenæan and the Delta Phi, each of which has a society hall and a well-selected library of several thousand volumes.

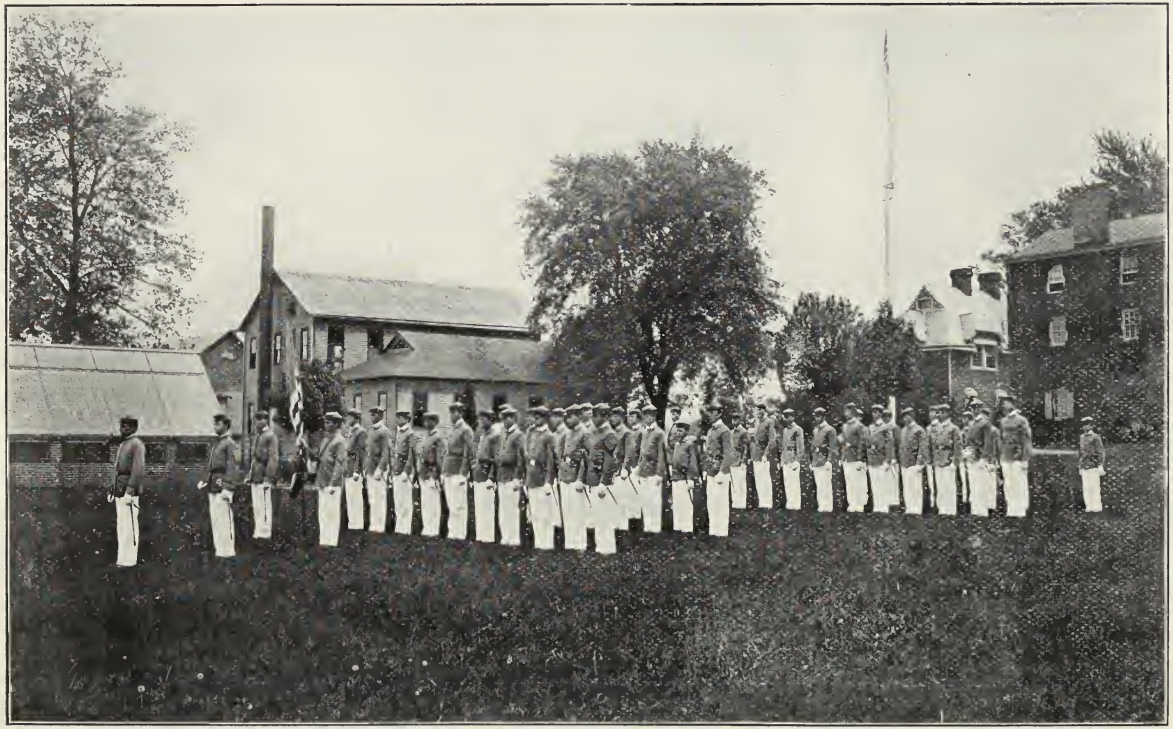
Religious Instruction.—The College is in no sense sectarian, but every student is expected to attend public worship at least once each Sunday at such place as the parent or guardian may select. All the students, except such as reside at too great a distance, are required to be present at the daily morning prayers.

Government.—Discipline is administered by the Faculty. The government is mild but firm. Sound principles of morality are inculcated, and sentiments of manliness, honor, and self-respect are

impressed upon the students. Misbehavior is reprimanded privately, and for gross disorder the parent or guardian is notified and requested to remove the offender. Suspension or expulsion is the last resort.

Students are not allowed to visit saloons or other places of resort that might injuriously affect their morals.

Under ordinary circumstances students will not be permitted to visit neighboring cities and towns without the permission of their parents or guardians, or of the President of the College. Permission granted by parents or guardians must be written and be deposited with the President.



THE BATTALION INSPECTION.

Degrees Conferred.

June 17, 1895.

Master of Arts.

CHARLES W. JONES,
S. EDWIN GRANT.

Bachelor of Arts.

C. ORAN COOPER,
HORACE G. EASTBURN,
W. WATSON HARRINGTON,
GLENN M. LITSINGER,
WILLIAM U. REYBOLD,
CRAWFORD STEVENS,
HERMAN M. SYPHERD.

Bachelor of Civil Engineering.

EDWARD W. COOCH, ANDREW KERR, EDWARD F. MULLEN.

Bachelor of Mechanical Engineering.

FREDERICK R. BARTLETT, FRANK H. HYNSON.

Bachelor of Electrical Engineering.

CARL HARRINGTON, WALDO C. WILSON.

Students for 1895-6.

SENIORS.

Albert S. Cooper,	L. S.,	Camden, Del.
William H. Cooper, Jr.,	L. S ,	Kenton, Del.
Harry R. Draper,	C. E.,	Milford, Del.
Samuel Eastburn,	C. E.,	Union, Del.
John T. Henderson,	C. E.,	Appleton, Md.
Frank K. Hynson,	E. E.,	Kent Island, Md.
W. B. Jester,	S.,	Delaware City, Del.
George McIntire,	L. S.,	Delaware City, Del.
Edwin C. Reybold, Jr ,	L. S.,	Delaware City, Del.
E. Laurence Smith,	L. S ,	Appleton, Md.
Clarence A. Short,	C. E.,	Seaford, Del
George D. Truitt,	L S.,	Milford, Del.
W. Owen Sypherd,	L. S.,	St. Georges, Del.
Robert B. Wolf,	E. E.,	Newark, Del.

JUNIORS.

James K. Burnite,	L. S.,	Newark, Del
Levi H. Cooch,	Spec.,	Cooch's Bridge, Del.
Samuel L. Conner,	C.,	Wilmington, Del
William Ellis,	C.,	Delmar, Md.
George G. Henry,	E. E.,	Newark, Del.
Charles Osmond,	C. E.,	Newark, Del.
Louis L. Pratt,	E. E.,	Milford, Del.
Edwin T. Phillips,	E E.,	New Castle, Del.
Ira L. Pierce,	S.,	Wilmington, Del.
Ernest W. Sipple,	L S ,	Frederica, Del.
Lee O. Willis,	M. E.,	Newark, Del.

SOPHOMORES.

W Ray Baldwin,	L. S.,	Elkton, Md
Edmund J. Barnes,	E. E.,	Wilmington, Del.
J. Paul Blore,	E. E.,	Wilmington, Del.
Joseph F. Brewster,	L S.,	Barksdale, Md.
J. Emory Chipman,	L. S.,	Laurel, Del.
Henry Littleton Constable,	Spec.,	Elkton, Md.
J. Vance Craig,	E. E.,	St. Georges, Del.
George N. Davis,	L. S.,	Laurel, Del.
G. Edgar Folks,	C.,	Wilmington, Del.
Harry P. Gamble,	M. E.,	Newark, Del.
David D. Good,	E. E.,	Osceola Mills, Pa.
Edmund S. Hellings,	L. S.,	Wilmington, Del.
Edwin Krause,	E. E.,	Osceola Mills, Pa.
Henry V. Marvel,	L. S.,	Avondale, Pa.
Hugh M. Morris,	L. S.,	Greenwood, Del.
John T. Mullins,	L. S.,	Faulkland, Del.
Herbert D. Simpler,	L. S.,	St. Georges, Del.
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Emmet L. Tosney,	E. E.,	Delaware City, Del.
B. Albert Whitely,	L S.,	Frederica, Del.

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H. M. Armstrong,	S.,	Cooch's Bridge, Del.
S. H. Baynard, Jr.,	L. S.,	Wilmington, Del.
Homer S. Brennan,	M. E.,	Wilmington, Del.
Joseph W. Brown,	E. E.,	Odessa, Del.
Merritt Burke,	Spec.,	Wilmington, Del.
H. Louis DuHadway,	L. S.,	Cambridge, Md
Charles M. Eastburn,	C. E.,	Wilmington, Del.
Harold Green,	M. E.,	Middletown, Del.
John T Harrington,	C. E.,	Wilmington, Del.
Everett C. Johnson,	L. S.,	Selbyville, Del.
Chas. E. Lewis,	E. E.,	Newark, Del.
E. H. McCabe, Jr.,	L. S.,	Roxana, Del.

F. O. MacSorley,	L. S.,	Newark, Del.
Roger O. Mason,	L. S.,	Newark, Del.
Geo. C. Medill,	L. S.,	Newark, Del.
Wm. H. Megee,	L. S.,	Milton, Del.
T. Rankin Nivin,	L. S.,	Strickersville, Pa.
Richard P. Reed,	C. E.,	Wilmington, Del.
J. Lamont Stewart,	L. S.,	Newark, Del.
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Howard M. Wilson,	M. E.,	Dover, Del.
Willard F. Wood,	M. E.,	Newport, Del.
Edward Woodall, Jr.,	C. E.,	Easton, Md.

Special Students in Agriculture.

Clarence Brown,	Stanton, Del.
Edward A. McKinley,	Philadelphia, Pa.
Arnold Naudain, Jr.,	Stanton, Del.

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DELAWARE COLLEGE.—DORMITORY.

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FRONT VIEW OF DELAWARE COLLEGE.

CATALOGUE

OF THE

OFFICERS AND STUDENTS

OF

DELAWARE COLLEGE,

NEWARK, DELAWARE,

FOR THE YEAR 1896-97.

AND ANNOUNCEMENTS

FOR THE YEAR 1897-98.

THE JOHN M. ROGERS PRESS,
WILMINGTON, DEL.,
1897.

CALENDAR, 1897.

June 7-14—Annual Examinations.
June 13—Baccalaureate Sermon.
June 15—Annual meeting of Board of Trustees.
Anniversary of the Athenæan Literary Society.
June 16—Commencement exercises, 10.30 A. M.
Meeting of Alumni.
Anniversary of Delta Phi Literary Society.

SUMMER VACATION.

FALL TERM.

Sept. 13—Monday, 10 A. M., Entrance Examinations begin.
Sept. 14—Tuesday, First Term begins.
Dec. 20-24—First Term Examinations.
Dec. 24—Friday, First Term ends.

WINTER VACATION, 1898.

WINTER TERM.

January 4—Tuesday, 8.50 A. M., Second Term begins.
March 28—Monday, Spring Meeting of the Board of Trustees.
March 28-31—Second Term Examinations.
March 31—Thursday, Second Term ends.

SPRING RECESS.

SPRING TERM.

April 5—Tuesday, 8.50 A. M., Third Term begins.
June 6-10—Annual Examinations.
June 12—Sunday, Baccalaureate Sermon.
June 13—Monday, Class Day. Declamation contest.
June 14—Tuesday, Annual Meeting of the Board of Trustees.
Anniversary of the Athenæan Literary Society.
June 15—Wednesday, Commencement Exercises, 10.30 A. M.
Meeting of the Alumni.
Anniversary of the Delta Phi Literary Society.

CORPORATION.

THE BOARD OF TRUSTEES.

His Excellency, GOV. EBE W. TUNNELL, *ex-officio.*

The President of the College, *ex-officio.*

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Professor of Agriculture and Biology.

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Professor of Mechanical and Electrical Engineering.

EDWARD N. VALLANDIGHAM, PH. B.,
Professor of the English Language and Literature, and Political Science.

EUGENE W. MANNING, M. A., PH. D.,
Professor of Modern Languages.

ELISHA CONOVER, M. A.,
Professor of Latin and Greek.

LIEUT. WALTER H. GORDON, 18th U. S. Infantry,
Professor of Military Science and Tactics, Commandant of Cadets, and Instructor in Mathematics and Engineering.

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Instructor in Elocution and Oratory.

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Instructor in Mechanical and Electrical Engineering.

CHARLES J. HIBBERD,
Instructor in Shopwork.

FREDERIC H. ROBINSON, C. E.,
Secretary of the Faculty.

WILLIAM H. BISHOP, B. S.,
Librarian.

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Manlove Hayes, Esq.,	Edward Reynolds, Esq.

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FREDERICK D. CHESTER, M. S., Botanist.
CHARLES L. PENNY, M. A., CHEMIST.
WILLIAM H. BISHOP, B. S., Agriculturist and Meteorologist.
H. P. EVES, D. V. M., Veterinarian.
G. HAROLD POWELL, M. S., Horticulturist and Entomologist.

DELAWARE COLLEGE.

Delaware College is situated at Newark, a quiet, well-ordered, and hospitable village of fifteen hundred inhabitants in the Northwestern part of the State. Newark is connected with Philadephia, Wilmington, Baltimore and Washington by the Pennsylvania, and Baltimore and Ohio railroads and there are few points in Delaware or in the Peninsular counties of Maryland distant from the Village more than four hours by rail. The region about Newark is one of the most healthful and beautiful on the Atlantic slope, and the site of the College, near the center of the town, is one of unusual charm. The Village has an excellent water supply, and is lighted by electricity.

Delaware College was chartered in 1833 by Act of the Delaware Legislature, and the doors of the College were first opened to students in May of the following year. The College had been doing for a quarter of a century an important work not only for Delaware but as well for neighboring parts of Pennsylvania and Maryland, when by a series of misfortunes, she was forced in the Spring of 1859 to close her doors.

Eleven years later the College was resuscitated, having meanwhile been designated by Act of the Delaware Legislature as a beneficiary under the Act of Congress apportioning to each of the several States large areas of public lands to form the basis of endowments for Colleges, especially devoted to the teaching of Agriculture and the Mechanic Arts, and Military Tactics. This Act of Congress commonly known as the "Morrill Bill" from its originator, Senator Morrill, of Vermont, declares that the Colleges made beneficiary under its provisions shall have as their leading object "without excluding other scientific and classical studies and including Military tactics, to teach such branches of learning as are related to Agriculture and the Mechanic Arts * * * * * * in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." In consideration of the adoption and establishment of Delaware College as the institution to be provided by the State of Delaware in accordance with the provisions of the Act of Congress in question "a joint and equal interest in the grounds, buildings, libraries and vested funds of the College proper" was conveyed to the State of Delaware and equal representation upon the Board of Trustees was given the State.

RECITATION HALL.

LIBRARY
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UNIVERSITY OF ILLINOIS

The Board of Trustees, when full, consists of fifteen members representing the original Board, and fifteen members on the part of the State appointed by the Governor, five from each of the three counties. The Governor of the State and the President of the College are members *ex-officio*.

In 1889, by Act of the Delaware Legislature, the Delaware College Agricultural Experiment Station was established in connection with the College under the provisions of an Act of Congress approved March 2, 1887, commonly known as the "Hatch Bill," appropriating $15,000 annually for the purpose of "acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture and to promote scientific investigation and experiment respecting the principles and applications of Agricultural science under direction of the College or Colleges established in each of the States and Territories" in accordance with the provisions of the "Morrill Bill."

Delaware College is beneficiary also under a further Act of Congress, known as the "New Morrill Bill," approved August 30th, 1890, which appropriated for the year then current $15,000 to each State for the "Land Grant Colleges" and provided for the increase of the appropriation by $1,000 each year until it should reach $25,000 a year. Delaware College receives annually four fifths of this appropriation, one fifth, in accordance with the provisions of the bill, being applied to the maintenance and support of the College at Dover for the education of colored students.

The appropriations provided for in this act are to be applied "to instruction in Agriculture, the Mechanic Arts, the English Language and the various branches of mathematical, physical, natural and economic sciences with special reference to their applications in the industries of life, and to the facilities for such instruction."

Stimulated by the increased income provided by this last Act, Delaware College has within the past six years enlarged her corps of instructors and greatly increased her equipment of apparatus and appliances, so that she is now vastly better able than ever before in her whole history to perform her appointed duty.

The buildings of the College, situated in an ample and beautiful campus, shaded by trees as old as the institution itself, consist of the Dormitory, a large brick structure which was originally the sole College building, and is still occupied in part by

laboratories, the old library, the literary societies and recitation rooms; Recitation Hall, a handsome brick building erected by the State in 1891; the wood-working shop and the machine shop, also recently provided by the State, where are housed machinery and apparatus for a thorough practical course of instruction in the mechanic arts; the gymnasium and drill hall, which is amply equipped for indoor physical exercise.

The Experiment Station occupies a building on the College grounds which contains offices, libraries and laboratories of the station workers. The Station has also a large green-house, with laboratory adjoining, in the rear campus, and several buildings used for storage and other purposes in the conduct of the various lines of experimental work.

A considerable part of the rear campus is occupied as an athletic field and it affords splendid facilities for out-door sports and games.

The College buildings are heated by steam and are supplied with water by the town Water Works.

Tuition is free to all students from the state of Delaware, and the College thus constitutes a part of our system of free public instruction. She places within reach of the young men of the State a thorough collegiate training with no other cost than that of living and the provision of necessary books and a few inconsiderable fees to cover expenses incurred by the institution. Her work is laid out upon broad lines, and the culture of liberal learning and the practical usefulness of the applied sciences are equally emphasized in her scheme of education. While in pursuance of the special aims of her organization, stress is laid upon those departments which build up good citizenship and useful manhood, the place so wisely provided in the foundation of the "Land Grant" Colleges is given to the refining graces and amenities of the older learning.

LITERARY SOCIETIES.

Two Literary Societies, each nearly as old as the College, are not only important adjuncts to the social life of the institution but extremely valuable aids in its educational work. The Athenaean and Delta Phi Societies occupy a place midway between the literary societies of some larger colleges and the Greek Letter fraternities now widely extended throughout the college system

of the United States. The two societies at Delaware College preserve the useful exercises common to most literary societies, and at the same time are strongly marked with the spirit of enthusiastic loyalty and brotherhood characteristic of the Greek Letter fraternities. There has never been a time when the Societies did not command the respect and enthusiasm of the undergraduates, and it is the uniform testimony of graduates that the Societies stood to them during their course as among the most important and valuable influences of the College. Each Society has a comfortable hall in the College dormitory, and each has a well chosen library covering the ground of general literature, history, biography, and popular science.

The Athenæan Literary Society, according to the testimony of its founders, was founded, December 18, 1834, about six months after the opening of the College. The Society's first constitution was adopted in February 1835, and the Society was incorporated by Act of the Delaware Legislature dated February 11, 1881.

The Delta Phi Literary Society claims for itself somewhat greater age than its rival, but was not legally incorporated until January 12, 1835. The Society obtained a new charter from the Legislature of Delaware about 1871, and another in 1895.

Both Societies are in a flourishing condition, and so excellent is the influence of these organizations that the Faculty earnestly counsels every student to connect himself early in his course with one or the other.

COURSES OF STUDY.

The following courses of study leading to a degree are offered by the College;

1.—The *Classical Course*, leading to the degree B. A.

2.—The *Latin Scientific Course*, leading to the degree B. A.

3.—The *Agricultural Course*, leading to the degree B. S.

4.—The *General Science Course*, leading to the degree B. S.

5.—The *Civil Engineering Course*, leading to the degree B. C. E.

6.—The *Mechanical Engineering Course*, leading to the degree B. M. E.

7.—The *Electrical Engineering Course*, leading to the degree B. E. E.

There are offered, besides, a Two Years Course in Agriculture, not leading to a degree, and a short Winter Course in Agriculture covering the time of the Second Term.

Course 4 has been arranged for such students as may desire liberal training in Language and Science, but may not care to take the Latin of Course 2, nor the Agriculture of Course 3.

In some of the Courses a considerable degree of freedom of election of subjects is permitted in the Junior and Senior years with a view to enabling students, who have determined upon their life-work, so to shape their undergraduate course as best to prepare them for the work of their chosen calling. The very nature of some of the Courses, notably those in Engineering, precludes any great amount of elective freedom, but in the Senior year of these Courses opportunity is offered for advanced study along special lines. The great variety of Courses offered practically secures all the advantages of an elective system, while their largely prescribed form assures a broad foundation of general and liberal education. In all of the Courses, even in those that lead to immediately practical ends, the purely educational side of college life has been distinctly kept in mind.

In the assignment of the honors of the graduating class the courses are of equal rank.

REQUIREMENTS FOR ADMISSION.

Candidates for admission to the Freshman Class must be at least sixteen years of age.

In all cases they must give satisfactory evidence of good moral character, and when coming from another institution, they must present a certificate of honorable dismissal.

For entrance to the Course in Agriculture and Science, the General Science Course, and the several Engineering Courses, candidates must pass a thorough examination in English, History of the United States, Geography, Arithmetic, Algebra through Quadratics, and plane Geometry.

Candidates for admission to the Latin Scientific Course must sustain an examination in Latin Grammar and Reader, Cæsar, and Vergil, in addition to the subjects mentioned above.

The requirements for admission to the Classical Course include, besides the foregoing subjects, Physiology, Greek Grammar, and the first two books of Xenophon's Anabasis.

Examinations are not required of candidates from schools that have courses of study fully covering our entrance requirements, when it is ascertained that the instruction given in such

schools really fits students for undertaking the work of the College. Candidates from schools to which this privilege is granted are required to present a certificate from the Principal, setting forth in detail the nature and extent of the work accomplished. Upon application by the Principal of any school from which students are received in this manner, the College furnishes blank forms for certificate.

DETAILED EXPLANATION OF THE REQUIREMENTS FOR ADMISSION.

English.

Candidates for matriculation will be expected to show a fair knowledge of technical grammar, and to be able to express themselves in writing with reasonable accuracy as to spelling, punctuation and rhetorical form.

Candidates for matriculation in the College Year 1898-9 will be expected to give evidence of acquaintance with Washington Irving's Sketch Book, Edgar Allan Poe's Tales, Nathaniel Hawthorne's Wonder Book, and Mosses from an Old Manse, and the best known short poems of William Cullen Bryant, Henry Wadsworth Longfellow, Oliver Wendell Holmes, and John Greenleaf Whittier, together with the chief events in the lives of these authors.

Young men preparing to enter the College are advised, in case they have not access to the complete works of the authors named, to consult some trustworthy bookseller with a view to obtaining in cheap form the masterpieces of American Literature, and those charged with the duty of preparing young men for the College are urged to use as reading exercises in the advanced classes, selections from the works of the authors named.

United States History.

A good knowledge of the History of our country as contained in the ordinary text-books used in the schools is required.

Geography.

Candidates should show a fair knowledge of physical and political geography as given in the larger school geographies.

Arithmetic.

Thorough preparation in arithmetic is necessary for beginning the work of any of the regular courses. Candidates are required to pass an examination upon the whole of higher arithmetic. Great importance is attached to neatness, rapidity and accuracy in the solution of examples. Particular stress is laid upon readiness in dealing with fractions, decimals, percentage and square root. A working knowledge of the Metric System is very desirable.

Algebra.

A thorough acquaintance with the elementary operations of algebra, factoring, involution and evolution, radicals, fractional and negative exponents, simple and quadratic equations, is required. Candidates should possess the power of ready and accurate performance in ordinary algebraic processes, and of putting the language of simple problems into algebraic statement.

Plane Geometry.

Good preparation for entrance requires a year's study of plane geometry as given in the text books in common use.

Physiology.

In this subject Martin's Human Body (briefer course), or equivalent, is required.

Latin.

Cæsar, Gallic War, Books I-III; Vergil, Aeneid, Books I-II; A thorough knowledge of Latin Grammar.

Greek.

Xenophon, Anabasis, Books I-II. A thorough knowledge of Greek Grammar.

Entrance examinations will be held at Newark, Wilmington, Middletown, Smyrna, Georgetown, Seaford, Milford and Dover, Friday June 18th, 1897, and at Newark, on Monday, September 13th, 1897, beginning at 9.30 A. M.

Candidates desiring to do so can take part of the entrance examination in June and complete it in September.

ENTRANCE TO ADVANCED STANDING.

Candidates for entrance to an advanced class in any of the courses are required to sustain an examination upon all studies of the course up to the point at which they seek admission.

CHOICE OF STUDIES.

Students may, with the approval of their parents or guardians, enter any one of the departments; or they may take such select studies as they are prepared to pursue when circumstances make it advisable not to enter a regular course. Except in the case of mature students who may desire to do special work in any department, it is strongly urged that all applicants for admission prepare themselves for undertaking the work of a regular course.

Changes from one course to another can be made only at the opening of a term, with the approval of the Faculty and the consent of the parent or guardian.

Every student is required to have at least fifteen recitations, or their equivalent, weekly, unless specially excused for cause.

DEGREES.

Students who have satisfactorily completed the *Classical*, or the *Latin Scientific* Course, are entitled to receive the degree of *Bachelor of Arts;* those who have, in like manner, completed the Course in *Agriculture and Science*, or the *General Science* Course are entitled to receive the degree of *Bachelor of Science;* those who have completed any of the Courses *in Engineering* will receive the degree of *Bachelor of Civil, Mechanical, or Electrical Engineering* according to the Course pursued. Every Candidate for graduation in any of the Engineering Courses is required in addition to having pursued successfully the prescribed Course of study, to present to the professor in charge of his department, on, or before the first day of May next preceding the Candidate's graduation, a carefully prepared written description, accompanied by any necessary drawings, of some structure, machine or process, which he may have examined.

Every *Bachelor of Arts* who has prosecuted a Course of liberal study for three years after graduation will be entitled to receive the degree *Master of Arts;* and every *Bachelor of Science* who has prosecuted a Course of scientific study for three years after graduation will be entitled to receive the degree of *Master of Science.*

Each graduate of any of the Courses in Engineering will, after three years' practical and successful work in his calling as an Engineer, be entitled to the professional degree, M. E., C. E., or E. E., according to the Course he may have pursued, on the presentation of proper evidence of having performed such work.

In the case of all advanced degrees the candidate is required, as a condition precedent to the conferring of the degree, to write a satisfactory thesis, either literary, philosophical or scientific, and to submit the same to the Faculty at least six weeks before the annual meeting of the Board of Trustees. When a candidate applies for an advanced degree in any of the several Engineering departments, his thesis shall be on a topic related to his profession.

Copies of all theses submitted for degrees must be left with the College as its property.

I. CLASSICAL COURSE.

REMARKS:—In work not requiring outside preparation two and one half periods are counted as one. All work in the Freshman and Sophomore years is prescribed. In the Junior and Senior years electives are offered from which the student is required to select sufficient work to give him at least nineteen recitation periods or their equivalent each week. With the approval of the Faculty, the student may select other studies as substitutes for any offered among the electives.

FRESHMAN YEAR.

SUBJECTS.	PERIODS PER WEEK.		
	1st Term.	2d Term.	3d Term.
Rhetoric	2.0	1.0	
History of the English Language	1.0	1.0	
English Composition*	1 — 0.4	1 — 0.4	1 — 0.4
Elocution	1 — 0.4	1 — 0.4	1 — 0.4
American Politics		1.0	2.0
Civil Government			1.0
German or French	2.0	2.0	2.0
Latin	4.0	4.0	4.0
Greek	4.0	4.0	4.0
Algebra and Geometry	5.0	5.0	5.0
Drill	3 — 1.2	3 — 1.2	3 — 1.2
	20.0	20.0	20.0

*Class room work. Theses written outside of recitation hours required at stated periods.

CORPS OF CADETS.

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SOPHOMORE YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	2.0	2.0	2.0
English Literature	2.0	2.0	2.0
Composition*	1 = 0.4	1 = 0.4	1 = 0.4
Elocution	1 = 0.4	1 = 0.4	1 = 0.4
German or French	2.0	2.0	2.0
Latin	3.0	3.0	3.0
Greek	4.0	4.0	4.0
Trigonometry and Analytic Geometry	4.0	4.0	4.0
Drill	3 = 1.2	3 = 1.2	3 = 1.2
	19.0	19.0	19.0

JUNIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	1.0		
Political Economy		2.0	2.0
Composition*	1 = 0.4	1 = 0.4	1 = 0.4
German or French	2.0	2.0	2.0
Latin	3.0	3.0	3.0
Greek	3.0	3.0	3.0
Physics	3.0	3.0	3.0
Chemistry, Inorganic	3.0	3.0	3.0
Drill	3 = 1.2	3 = 1.2	3 = 1.2
	16.6	17.6	17.6
ELECTIVES.			
Analytic Geometry	3.0		
Calculus		3.0	3.0
Philosophy of History	2.0		
Literature	1.0	1.0	1.0
Public Speaking	1 = 0.4	1 = 0.4	1 = 0.4
Greek Testament	1.0	1.0	1.0

* See foot-note, page 16.

SENIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Comparative Politics	2.0		
Psychology		2.0	1.0
Logic			2.0
German or French	2.0	2.0	2.0
Latin	5.0	5.0	5.0
Greek	3.0	3.0	3.0
Sanitary Science	1.0	1.0	1.0
Chemical Laboratory	2= 0.8	2= 0.8	2= 0.8
	13.8	13.8	14.8
ELECTIVES.			
Public Speaking	1= 0.4	1= 0.4	1= 0.4
History of Philosophy		2.0	1.0
Natural Theology	2.0		
Moral Science	2.0		
Literature	1.0	1.0	1.0
Spanish or Italian	2.0	2.0	2.0
Greek Testament	1.0	1.0	1.0
Astronomy		2.0	2.0
Calculus	2.0		
Mineralogy	2.0	2.0	2.0
Organic Chemistry	3.0	3.0	3.0
Geology	2.0	2.0	
Biology	4.0	4.0	4.0
Drill	3= 1.2	3= 1.2	3= 1.2

II. LATIN SCIENTIFIC COURSE.

REMARKS:—In work not requiring outside preparation two and one-half periods are counted as one.

All work of the Freshman and Sophomore years is prescribed.

In the Junior and Senior years students are required to select sufficient work from the electives offered, or from other studies, with the approval of the Faculty, to make nineteen recitation periods, or their equivalent, each week.

FRESHMAN CLASS.

SUBJECTS.	PERIODS PER WEEK. 1st Term.	2d Term.	3d Term.
Rhetoric	2.0	1.0	
Composition *	1 = 0.4	1 = 0.4	1 = 0.4
Elocution	1 = 0.4	1 = 0.4	1 = 0.4
History of the English Language	1.0	1.0	
American Politics		1.0	2.0
Civil Government			1.0
German or French	2.0	2.0	2.0
Latin	4.0	4.0	4.0
Algebra and Geometry	5.0	5.0	5.0
Physiology	3.0		
Botany		3.0	3.0
Drill	3 = 1.2	3 = 1.2	3 = 1.2
	19.0	19.0	19.0

SOPHOMORE YEAR.

SUBJECTS.	PERIODS PER WEEK. 1st Term.	2d Term.	3d Term.
History	2.0	2.0	2.0
Literature	2.0	2.0	2.0
Composition*	1 = 0.4	1 = 0.4	1 = 0.4
Elocution	1 = 0.4	1 = 0.4	1 = 0.4
German or French	2.0	2.0	2.0
Latin	3.0	3.0	3.0
Trigonometry and Analytic Geometry	4.0	4.0	4.0
Inorganic Chemistry	3.0	3.0	3.0
Botany	2.0		
Zoology		2.0	2.0
Drill	3 = 1.2	3 = 1.2	3 = 1.2
	20.0	20.0	20.0

* See foot-note, page 16.

JUNIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	1.0		
Political Economy		2.0	2.0
Composition*	1= 0.4	1= 0.4	1= 0.4
Organic Chemistry	3.0	3.0	3.0
Chemical Laboratory	2= 0.8	2= 0.8	2= 0.8
Analytical Geometry and Calculus	3.0	3.0	3.0
Physics	3.0	3.0	3.0
Latin	3.0	3.0	3.0
German or French	2.0	2.0	2.0
Drill	3= 1.2	3= 1.2	3= 1.2
	17.4	18.4	18.4
Electives.			
Literature	1.0	1.0	1.0
Public Speaking	1= 0.4	1= 0.4	1= 0.4
Biology	2.0	2.0	2.0
Philosophy of History	2.0		

SENIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Comparative Politics	2.0		
Psychology		2.0	1.0
Logic			2.0
Sanitary Science	1.0	1.0	1.0
Geology	2.0	2.0	
Mineralogy	2.0	2.0	2.0
German or French	2.0	2.0	2.0
Latin	5.0	5.0	5.0
	14.0	14.0	13.0
Electives.			
Literature	1.0	1.0	1.0
History of Philosophy		2.0	1.0
Natural Theology	2.0		
Moral Science	2.0		
Astronomy		2.0	2.0
Calculus	2.0		
Spanish or Italian	2.0	2.0	2.0
Biology	4.0	4.0	4.0
Chemical Laboratory	2= 0.8	2= 0.8	2= 0.8
Public Speaking	1= 0.4	1= 0.4	1= 0.4
Drill	3= 1.2	3= 1.2	3= 1.2

* See foot-note, page 16.

III. AGRICULTURAL COURSE.

This course is designed for those who wish to follow any line of agricultural work as a business or become teachers or investigators in the sciences connected with Agriculture.

Its instruction is arranged to give the student a broad intellectual training, especially in Sciences, Modern Languages, English, and Economics.

The distinctively technical studies are placed mostly in the last two years, when the student is better prepared to grasp the principles involved.

In the Junior and Senior Years a sufficient amount of Elective work must be taken to bring the number of recitation periods up to nineteen, at least, per week.

Two and one-half periods of class-room, laboratory, or field work, not requiring outside preparation, are counted as one period.

FRESHMAN YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Rhetoric	2.0	1.0	
Civil Government			1.0
Composition*	1 = 0.4	1 = 0.4	1 = 0.4
Elocution	1 = 0.4	1 = 0.4	1 = 0.4
History of English Language	1.0	1.0	
American Politics		1.0	2.0
German	2.0	2.0	2.0
Algebra and Geometry	5.0	5.0	5.0
Physiology	3.0		
Botany		3.0	3.0
Soils	2.0		
Agriculture		2.0	2.0
Shop Work	6 = 2.4	6 = 2.4	6 = 2.4
Military Drill	3 = 1.2	3 = 1.2	3 = 1.2
	19.4	19.4	19.4

* See foot-note, page 16.

SOPHOMORE YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	2.0	2.0	2.0
Literature	2.0	2.0	2.0
Composition*	1= 0.4	1= 0.4	1= 0.4
Elocution	1= 0.4	1= 0.4	1= 0.4
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Trigonometry and Analytic Geometry	4.0	4.0	4.0
Inorganic Chemistry	3.0	3.0	3.0
Botany	2.0		
Zoölogy		2.0	2.0
Agriculture	1.0	1.0	1.0
Military Drill	3= 1.2	3= 1.2	3= 1.2
	20.0	20.0	20.0

JUNIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	1.0		
Political Economy		2.0	2.0
Composition*	1= 0.4	1= 0.4	1= 0.4
Organic Chemistry	3.0	3.0	3.0
Chemical Laboratory	2= 0.8	2= 0.8	2= 0.8
Physics	3.0	3.0	3.0
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Agriculture	5.0		
Animal Husbandry			4.0
Horticulture and Entomology		4.0	
Military Drill	3= 1.2	3= 1.2	3= 1.2
	18.4	18.4	18.4
Electives.			
Literature	1.0	1.0	1.0
Public Speaking	1= 0.4	1= 0.4	1= 0.4
Biology	2.0	2.0	2.0
Philosophy of History	2.0		
Analytic Geometry and Calculus	3.0	3.0	3.0

* See foot-note, page 16.

SENIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Comparative Politics	2.0		
Psychology		2.0	1.0
Logic			2.0
Sanitary Science	1.0	1.0	1.0
Geology	2.0	2.0	
Mineralogy	2.0	2.0	2.0
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Agriculture	4.0		4.0
Veterinary Science		4.0	
Plant Diseases		3.0	
	15.0	18.0	14.0

All elective studies offered in the Senior Year of the Latin Scientific Course (see page 20,) are open to students in this Course.

GENERAL SCIENCE COURSE.

This course is arranged for those who desire a training based on Science, History, Modern Languages and English, but do not wish Latin or the special training of the Agricultural or Engineering Courses.

During the Junior and Senior years the same elective studies are offered as in the Latin-Scientific Course.

In this way opportunity is given for some specialization in study during those years.

Students in this course are required, in the Junior and Senior years, to elect a sufficient amount of work to bring their number of recitation periods up to at least nineteen a week. Two and one half periods of class room work, not requiring outside preparation, are counted as one period.

FRESHMAN YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Rhetoric	2.0	1.0	
Composition*	1= 0.4	1= 0.4	1= 0.4
Elocution	1= 0.4	1= 0.4	1= 0.4
History of English Language	1.0	1.0	
American Politics		1.0	2.0
Civil Government			1.0
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Algebra and Geometry	5.0	5.0	5.0
Physiology	3.0		
Botany		3.0	3.0
Military Drill	3= 1.2	3= 1.2	3= 1.2
Shop-work or Drawing	6= 2.4	6= 2.4	6= 2.4
	19.4	19.4	19.4

SOPHOMORE YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
History	2.0	2.0	2.0
Literature	2.0	2.0	2.0
Composition*	1= 0.4	1= 0.4	1= 0.4
Elocution	1= 0.4	1= 0.4	1= 0.4
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Trigonometry and Analytic Geometry	4.0	4.0	4.0
Inorganic Chemistry	3.0	3.0	3.0
Botany	2.0		
Zoölogy		2.0	2.0
Military Drill	3= 1.2	3= 1.2	3= 1.2
	19.0	19.0	19.0

* See foot-note, page 16.

JUNIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	1.0		
Political Economy		2.0	2.0
Composition*	1= 0.4	1= 0.4	1= 0.4
Organic Chemistry	3.0	3.0	3.0
Chemical Laboratory	2= 0.8	2= 0.8	2= 0.8
Analytic Geometry and Calculus	3.0	3.0	3.0
Physics	3.0	3.0	3.0
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Military Drill	3= 1.2	3= 1.2	3= 1.2
	16.4	17.4	17.4
ELECTIVES.			
Literature	1.0	1.0	1.0
Public Speaking	1= 0.4	1= 1.4	1= 0.4
Biology	2.0	2.0	2.0
Philosophy of History	2.0		

SENIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Comparative Politics	2.0		
Psychology		2.0	1.0
Logic			2.0
Sanitary Science	1.0	1.0	1.0
Geology	2.0	2.0	
Mineralogy	2.0	2.0	2.0
German	2.0	2.0	2.0
	9.0	9.0	8.0

Electives as in Latin Scientific Course, see page 20.

* See foot-note, page 16.

COURSE IN CIVIL ENGINEERING.

NOTES.

Numerals denote periods of forty-five minutes each.

In work not requiring outside preparation, two and one-half periods count as one.

All work in Freshman, Sophomore and Junior years is prescribed. German is required for three years or French for three.

Opportunity is offered for election of a portion of the work in the second and third terms of the Senior Year.

Each student must elect, in each of these terms, one of the recommended technical electives or a technical equivalent.

FRESHMAN YEAR.

SUBJECTS.	PERIODS PER WEEK.		
	1st Term.	2d Term.	3d Term.
Rhetoric	2.0	1.0	
History of English Language	1.0	1.0	
English Composition*	1 = 0.4	1 = 0.4	1 = 0.4
Elocution	1 = 0.4	1 = 0.4	1 = 0.4
American Politics		1.0	2.0
Civil Government			1.0
German or French	2.0	2.0	2.0
Mathematics	5.0	5.0	5.0
Steam Engines and Steam Boilers	2.0	2.0	2.0
Drawing	6 = 2.4	6 = 2.4	6 = 2.4
Shop-work	6 = 2.4	6 = 2.4	6 = 2.4
Military Science and Tactics	3 = 1.2	3 = 1.2	3 = 1.2
	18.8	18.8	18.8

SOPHOMORE YEAR.

SUBJECTS.	PERIODS PER WEEK.		
	1st Term.	2d Term.	3d Term.
English Composition*	2 = 0.8	2 = 0.8	2 = 0.8
Elocution	1 = 0.4	1 = 0.4	1 = 0.4
German or French	2.0	2.0	2.0
Mathematics	4.0	4.0	4.0
Mechanics	3.0	3.0	3.0
Inorganic Chemistry	3.0	3.0	3.0
Surveying	2.0	2.0	2.0
Descriptive Geometry	2 = 0.8	2 = 0.8	2 = 0.8
Drawing	3 = 1.2	3 = 1.2	3 = 1.2
Field-work	3 = 1.2		3 = 1.2
Plotting, etc.		2 = 0.8	
Military Science and Tactics	3 = 1.2	3 = 1.2	3 = 1.2
	19.6	19.2	19.6

* See foot-note, page 16.

JUNIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
German or French	2.0	2.0	2.0
Mathematics	3.0	3.0	3.0
Mechanics of Solids	3.0	3.0	3.0
Physics	3.0	3.0	3.0
Chemical Laboratory	2= 0.8	2= 0.8	2= 0.8
Mineralogy	2.0	2.0	2.0
Surveying	2.0	2.0	2.0
Drawing	2= 0.8	4= 1.6	2= 0.8
Field-work	4= 1.6		4= 1.6
Military Science and Tactics	3= 1.2	3= 1.2	3= 1.2
	19.4	18.6	19.4

SENIOR YEAR.

Subjects	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Calculus	2.0		
Hydromechanics		3.0	3.0
Geology	2.0	2.0	
Sanitary Science	1.0	1.0	1.0
Mechanics of Materials, etc.	3.0	3.0	
Railroad Engineering	3.0		
Highways			2.0
Roofs and Bridges	2.0 3= 1.2	4.0	
Building Construction	2.0		
Masonry Construction			4.0
Contracts and Specifications			3.0
Theme	2= 0.8	3= 1.2	
Drawing	2= 0.8	4= 1.6	2= 0.8
Field-work	4= 1.6		4= 1.6
Engineering Laboratory		5= 2.0	
	19.4	17.8	15.4
Electives.			
Railroad Engineering		2.0	
Applied Electricity			4.0
Bridge Engineering		2.0	4.0
Materials of Construction		2.0	4.0
Building Construction		2.0	4.0
Water Supply		2.0	4.0
Sewerage		2.0	4.0
Hydraulics		2.0	
Pumps and Hydraulic Motors			3.0
Spanish	2.0	2.0	2.0

COURSE IN MECHANICAL AND ELECTRICAL ENGINEERING.

NOTES.

Numerals denote periods of forty-five minutes each.

In work not requiring outside preparation, two and one half periods count as one.

All work in Freshman, Sophomore and Junior years is prescribed.

Opportunity is offered for election in a portion of the work in the Senior year.

Each student must select at least one of the recommended technical electives or the equivalent.

FRESHMAN YEAR.

SUBJECTS.	PERIODS PER WEEK.		
	1st Term.	2d Term.	3d Term.
English	3.8	3.8	3.8
Algebra	5.0	5.0	5.0
Drawing	6= 2.4	6= 2.4	6= 2.4
Steam Engines and Boilers	2.0	2.0	2.0
German or French	2.0	2.0	2.0
Shop-work	6= 2.4	6= 2.4	6= 2.4
Military Science and Tactics	3= 1.2	3= 1.2	3= 1.2
	18.8	18.8	18.8

SOPHOMORE YEAR.

SUBJECTS.	PERIODS PER WEEK.		
	1st Term.	2d Term.	3d Term.
English Composition*	2= 0.8	2= 0.8	2= 0.8
Elocution	1= 0.4	1= 0.4	1= 0.4
Chemistry	3.0	3.0	3.0
Mathematics	4.0	4.0	4.0
Drawing	3= 1.2	3= 1.2	3= 1.2
Mechanics	3.0	3.0	3.0
German or French	2.0	2.0	2.0
Shop-work	6= 2.4	6= 2.4	6= 2.4
Military Science and Tactics	3= 1.2	3= 1.2	3= 1.2
	18.0	18.0	18.0

* See foot-note, page 16.

JUNIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Chemical Laboratory	2= 0.8	2= 0.8	
Mathematics	3.0	3.0	3.0
Physics	3.0	3.0	3.0
Kinematics	3.0	3.0	
Graphical Statics			3.0
Mechanics	3.0	3.0	3.0
Valve Gears	2.0	2.0	
Electricity			3.0
German or French	2.0	2.0	2.0
Drawing	3= 1.2	3= 1.2	3= 1.2
Shop-work	3= 1.2	3= 1.2	3= 1.2
Military Science and Tactics	3= 1.2	3= 1.2	3= 1.2
	20.4	20.4	20.6

MECHANICAL ENGINEERING.—SENIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Mathematics	2.0		
Roofs and Bridges	3.0		
Thermodynamics	4.0		
Steam Engine Design	3.0	3.0	
Machine Design	3= 2.0	3= 2.0	3= 2.0
Mechanics of Materials	3.0	3.0	
Steam Boilers		3.0	3.0
Hydromechanics		3.0	3.0
Thesis		3= 1.2	
Pumps and Hydraulic Motors			3.0
Transmission of Power			2.0
Specifications and Contracts			3.0
Shop-work	6= 2.4	6= 2.4	6= 2.4
	19.4	17.6	18.4
ELECTIVES.			
Elocution	1= 0.4	1= 0.4	1= 0.4
Railroads	3.0		
Bridges		4.0	4.0
Building Construction	2.0		
Astronomy		2.0	2.0
Water Supply			4.0
Military Science and Tactics	3= 1.2	3= 1.2	3= 1.2

ELECTRICAL ENGINEERING.—SENIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Mathematics	2.0		
Steam Engine Design	3.0		
Thermodynamics	4.0		
Electrical Measurements	1.0	2.0	
Electrical Machinery	4.0	3.0	
Boilers		3.0	
Hydromechanics		3.0	3.0
Thesis		3= 1.2	
Pumps and Hydraulic Motors			3.0
Applied Electricity			5.0
Specifications and Contracts			3.0
Machine Design	3= 2.0	3= 2.0	3= 2.0
Mechanical and Electrical Laboratory	6= 2.4	6= 2.4	6= 2.4
	18.4	16.6	18.4
ELECTIVES.			
Roofs and Bridges	3.0		
Mechanics of Materials	3.0	2.0	
Elocution	1= 0.4	1= 0.4	1= 0.4
Railroads	3.0		
Astronomy		2.0	2.0
Boilers			2.0
Transmission of Power			2.0
Bridges		4.0	4.0
Water Supply			4.0
Military Science and Tactics	3= 1.2	3= 1.2	3= 1.2

SHORTER COURSE IN AGRICULTURE.

First Year.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Rhetoric	2.0	1.0	
Composition*	I= 0.4	I= 0.4	I= 0.4
American Politics		1.0	2.0
Civics			1.0
Inorganic Chemistry	3.0	3.0	3.0
Physiology	3.0		
Zöology	3.0		
Botany		2.0	2.0
Entomology		4.0	
Farm Crops and Soils		4.0	
Stock Breeding			4.0
Breeds of Live Stock			3.0
Farm Economy, Farm Appliances and Machinery	4.0		
Algebra and Geometry	5.0	5.0	5.0

Second Year.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Literature	2.0	2.0	2.0
Composition*	I= 0.4	I= 0.4	I= 0.4
Organic Chemistry	3.0	3.0	3.0
Sanitary Science	1.0	1.0	1.0
Botany	4.0		
Manures and Fertilizers and their Use	4.0		
Stock Feeding and Dairying	2.0		
Plant Diseases		2.0	2.0
Horticulture		4.0	
Veterinary Science		3.0	3.0
The Composition and Structure of Plants			3.0

Note.—Shop-work throughout at least one year.

* See foot-note, page 16.

METHODS OF INSTRUCTION.

English Language and Literature.

The studies in this department include Rhetoric, Composition, the History of the English Tongue, and Literature.

The study of Rhetoric and of the history of the English Tongue are begun in the first term of the Freshman Year, and the former is continued throughout the year, while the latter occupies but two terms. Along with the study of Rhetoric there is special class instruction in the art of Composition and throughout the entire course written themes are frequently required of all students.

American Literature is taken up in the first term of the Sophomore year, and English Literature somewhat later in the same term.

Literature is a required study to the end of the Sophomore Year only, and is optional thereafter throughout the remainder of the course. The object aimed at during the required course in American and English Literature is to cultivate a taste for the best reading rather than to cumber the memory with names, dates and mere biographical details concerning the masters of literature.

A considerable amount of reading is required during this part of the course, and the lectures are made short in order that there shall be time for reading and discussion in class.

The optional course in literature is devoted to the study of the great masters and of the history and philosophy of literature.

A library chosen especially with a view to the needs of students in literature is an important adjunct to the study, or perhaps it would be more nearly true to say that the class room is made an adjunct and introduction to the library.

Mental, Moral and Political Science.

The more abstruse studies in these departments are placed late in the course, and some of them are made elective for part or all of the students.

The effort has been made to provide a consistent and well developed course in Political Science, including History, Political Economy, Comparative Politics and the Philosophy of History.

The study of American Politics is introduced in the second term of the Freshman Year, and here the intent is that as far as

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possible the text-book shall be subordinated to special investigations to be made by the students themselves.

The library is the workshop of students in this branch, and many books bearing especially upon this subject have recently been provided.

Following upon the subject of American Politics comes the study of Civil Government in the United States, and the general subject is continued throughout the Sophomore Year in historical studies.

These in turn lead to Political Economy, Comparative Politics and related branches.

Course in Elocution and Public Speaking.

The object of this course is effective public speaking. Three contributory objects are aimed at in the work,—a better command of language, original thinking and mental discipline.

The study is required in the Freshman and Sophomore Years' but is thereafter elective.

Freshmen are especially instructed in the art of reading aloud. The effort there is not so much to train the student in dramatic expression, as to insist that he thoroughly master the meaning of what he reads, and thus to make sure that his reading shall be easily intelligible to the reader. It is hoped that the training at this point in the course will develop a keenly appreciative taste in literature, and the intent here and throughout the course is to make the study of Elocution an important aid to the study of the English Language and Literature. It is to this end that selections for reading and declamation are, when it is possible, chosen from the works of the authors at the same time under consideration by the class in English Literature. Considerable time is given in the Freshman Year to the subject of pronunciation, voice development, and the principles of modulation.

The work in the Sophomore Year is chiefly devoted to the preparation and delivery of declamations. These are not mere imitative exercises. The student is expected to prepare them without assistance. The delivery of each declamation is followed by stimulative criticism. Declamations must be selected from the works of the best British and American writers, or from the speeches of public men. The College library affords abundant material for selection. Some of the exercises required of the Freshmen are continued throughout the Sophomore Year.

Such members of the Junior and Senior classes as elect to continue the study of declamation, are trained in public speaking. Speech-making is begun in its simplest form,—conversation, followed by narrative description, extempore speaking, and, finally, argument and debate. The whole naturally leads up to the commencement orations.

There are special meetings when all classes come together for declamations, speeches and lectures, and there are annual public contests in declamation with an award of prizes.

Class instruction includes parliamentary law, the principles of argumentation, the interpretation of selections, and the principles of oratory.

MODERN LANGUAGES AND LITERATURES.

French and German are among the required subjects of study, and Spanish and Italian are offered to such as wish to elect them. Each Student must take either German or French four years, or divide the four years of required modern language study between the two languages.

The work is so conducted as to give all an opportunity to learn to read the modern languages readily; to understand them when heard; to write them correctly, and so to be able to learn easily to speak them, if necessity arises; but the main object is to inspire such a love for the literatures and languages, as will be a source of pleasure and of intellectual growth. Lectures are occasionally given in English, French or German. Books are being collected, and advanced methods of work are being adopted, as fast as the time at command and the resources of the library will permit. Work has been done this year in the French classics, and the Romantic school, as well as the modern French writings; also in the German classics (including Faust), in modern German writings and in scientific German.

The publications of the Société des Anciens Textes Français, Godefroy's Old French Dictionary and other helps are now in the library, and it is proposed to form a class in Old French next year (1897–98.) Some elementary work in Old German will be offered. The work in Old German and Old French especially will be made to throw light on the English language and literature, as indeed all the work in the modern languages is intended to do.

The following courses will be offered in 1897–98.

FRENCH.

1. Beginning French. Grammar (Whitney). Easy reading in modern French. Twice a week.
2. The Romantic School. Crane's Romantisme Français. Hugo's Hernani. Grammar continued. Twice a week.
3. The French classics. Molière, Corneille, Racine. Course conducted largely in French. Writing French. Twice a week.
4. History of French Literature, with readings in Montaigne, Rabelais, etc. Course conducted chiefly in French. Old French (Aucassin and Nicolete.) Twice a week.

SPANISH.

5*. Grammar (Manning.) Easy Reading in modern Spanish. Twice a week.

ITALIAN.

6*. Grammar (Manning.) Easy reading in modern Italian. Twice a week.

GERMAN.

1. Beginning German. Grammar (Joynes-Meissner.) Easy reading in modern German. Twice a week.
2. Schiller's Jungfrau von Orleans. Lessing's Minna von Barnhelm. Goethe's Hermann und Dorothea. Grammar continued. Twice a week.
3. Goethe's Faust (Parts I. and II.) Course conducted largely in German. Writing German. Twice a week.
4. History of the German Literature. Course conducted chiefly in German. Selections from Middle High German writers. Twice a week.

LATIN AND GREEK.

COURSE OF STUDY AND METHODS OF INSTRUCTION.

FRESHMAN YEAR.

LATIN.—Nepos, De Viris Inlustribus. Vergil, Books III-VI. Four hours a week throughout the year.

GREEK.—Xenophon, Anabasis Books III-IV. Homer, Iliad Books I-III. Four hours a week throughout the year.

*Only one of these courses (probably Italian) will be given in 1897–98.

SOPHOMORE YEAR.

LATIN.—Cicero, 5 Orations. Ovid, Metamorphoses, 2500 verses. Prose composition. Three hours a week throughout the year.

GREEK.—Xenophon, Memorabilia. Homer, Odyssey. Herodotus, Book VIII. Four hours a week throughout the year.

JUNIOR YEAR.

LATIN.—Livy, 21st or 22d book. Horace, Odes, Satires, Epistles. Prose composition. Three hours a week throughout the year.

GREEK.—Plato, Phaedo. Thucydides, Book I. Demosthenes, 3d Olynthiac. Three hours a week throughout the year.

ELECTIVE.—Greek Testament, one hour a week throughout the year.

SENIOR YEAR.

LATIN.—Tacitus, Germania and Agricola. Juvenal, Satires. Plautus, Comedies. Collateral reading. Five hours a week.

GREEK.—Aeschylus, Prometheus Bound. Arrian, Anabasis of Alexander. Lucian, Timon. Collateral reading. Three hours a week throughout the year.

ELECTIVE.—Greek Testament, one hour a week throughout the year.

LATIN LANGUAGE AND LITERATURE.

Much of the training in the Freshman year is devoted to acquiring an extended vocabulary, familiarity with the Latin order of thought and syntax. Throughout the course the aim is to enable the student to acquire facility and quickness in reading at sight. Word-meaning is fixed by inspecting form, derivation, and comparing with synonymes. While the work of the first three years is limited at present to the study of authors of the Ciceroni-Augustan age, the work of the Senior year may be changed from time to time to embrace not only the leading authors of the Silver age but also the chief representatives of Early and Late Latin, thus giving the student a comprehensive scope of Latin literature. The public and private life of the Romans and their influence on modern literature and civilization are continually kept before the minds of the students. The topography of Rome with its remains, ancient life in its various aspects, and the other departments of archaeology will be discussed, illustrated by magic lantern slides.

GREEK LANGUAGE AND LITERATURE.

The authors in Greek are selected with a view to their representative character. The aim is to give the student some familiarity with the Greek epic, tragedy and comedy; with the historians, philosophers and orators. The student's attention is called to the differences in style of the authors and to dialectic peculiarities. Greek life and archaeology will also be discussed and illustrated by magic lantern slides. Collateral reading in Latin and Greek is required in the Senior year. New Testament Greek is offered as an elective in Junior and Senior year. In both departments the general principles of comparative philology are explained and applied and an effort is made to create in the student an impulse to pursue more thoroughly these subjects in a university and to prepare him to enter upon such courses with success and pleasure.

MATHEMATICS.

All the prescribed mathematical work of the College is required of students in the several Engineering Courses. In the Latin Scientific and General Science Courses it is required to the end of the Junior Year. In the Classical and Agricultural Courses the required work in mathematics ends with the Sophomore Year. The course in mathematics up to the end of the Sophomore Year is the same for all students.

In the Freshman Year a short general review of elementary algebra and plane geometry is given, but the main part of the time is occupied with the completion of algebra beyond what is required for admission and with solid geometry and the mensuration of solids. Throughout the year original exercises in demonstration and solution are required.

In the Sophomore year plane and spherical trigonometry are finished early in the second term, and during the rest of the year the conic sections are studied by purely geometrical, as well as by analytical methods.

Early in the Junior Year the Course in analytic geometry is completed, and the remainder of the year is given to the study of the differential and integral calculus.

Throughout the first term of the Senior Year an advanced course in the application of the calculus is pursued. In the second and third terms of the Senior Year instruction is given in

Astronomy, Young's General Astronomy being the text-book used.

Students who may desire to pursue advanced mathematical studies will have opportunities of receiving instruction in the Method of Least Squares, Differential Equations, Determinants, Quaternions, Theory of Functions, etc. Instruction in these subjects will be given by means of lectures, recitations and reading of standard authors in the class room.

PHYSICS.

The character and amount of instruction offered in special departments of Physical Science and continuing throughout the Sophomore, Junior and Senior Years are fully set forth under the proper headings in the description of the Engineering Courses.

Instruction is given by means of recitations, lectures, experimental demonstrations and laboratory exercises.

The Course in General Physics required of all students in any of the regular Courses extends through the Junior Year. The first term is given to the study of the laws and properties of matter, sound and heat. After the subject of heat has been finished, magnetism and electricity are studied in the second term. In the third term electricity and light are the subjects of study. The physical department is well equipped with apparatus for class room illustration and for laboratory work. The library of the department contains a valuable collection of standard books of reference and the leading journals, American and foreign are at all times accessible to the students.

CHEMISTRY MINERALOGY, GEOLOGY AND SANITARY SCIENCE.

Instruction is given in Pure and Applied Chemistry by lectures, recitations, and laboratory practice. This course extends through the Sophomore, the Junior, and the Senior year, and embraces the elements of Inorganic and Organic Chemistry. Students, after making themselves familiar with the details of experiments, are required to repeat the same in the laboratory.

The chemical laboratory is open daily for instruction in analytical chemistry.

The course in quantitative analysis includes the examination of simple and complex substances in the wet way, their analysis by the use of the blow-pipe and flame reactions, and the determination of minerals with the blow-pipe.

Students are required to keep a careful record of their work, and submit the same to the inspection of the Professor. Upon passing satisfactory examination in qualitative analysis, students may, if they so desire, take up quantitative analysis.

The Course of instruction in quantitative analysis includes the examination of simple and complex salts, minerals, ores, ashes of plants, fertilizers, water etc., by gravimetric and the volumetric methods.

In order to make the instruction as *practical* as possible, lectures upon the leading *Chemical Industries* will be given throughout the entire Course.

Assaying.—The assay laboratory is kept in full working order, completely furnished with crucible, scorification and cupelling furnaces, and everything for practical work in the assay of ores of lead, silver, gold, etc. The general principles as well as special methods of assaying are explained in the lecture room, and at the same time ores of the various metals are exhibited and described. From a collection of these ores from various parts of the country, the students are required to make a number of assays under the immediate supervision of the Professor.

Mineralogy.—The Course of instruction in Mineralogy extends throughout the Junior year. The first term is usually occupied with the discussion of the *Physical Properties* of minerals, including their morphological properties (Crystallography), their optical properties, hardness, specific gravity, etc. The second and the third terms are devoted to Descriptive Mineralogy. Students also receive practical instruction in Determinative Mineralogy.

Geology.—The work in this department comprises recitations and lectures upon General Geology throughout two terms of the Senior year. The student is first taught the principles of Lithology and of Microscopic Petrography. For this work the College has provided itself with the best petrographical microscopes and sets of hand specimens and thin sections of the typical rocks. The study of Structural and Dynamical Geology occupies the second term of the Senior year, when the student is taught the arrangement of rock masses, and the agencies concerned in their upheaval, erosion and metamorphism.

Sanitary Science.—The instruction in this important study is thoroughly practical, and embraces recitations and lectures on the following subjects: Water, Air, and Food; Disposal and Utilization of Sewage; Origin and Spread of Epidemics; Disinfectants and their Uses; Ventilation and Warming; Vital Statistics, etc.

BIOLOGY.

The aim of biological instruction is to give the student some knowledge of the various living things by which he is surrounded and the relation which man bears to them economically, biologically and morally, as well as to develop habits of careful observation and comparison, and close and accurate methods of thinking.

Most of the time is spent in actual study in the laboratory, which is supplied with tables, microscopes and reagents, as well as with illustrative specimens and charts.

Material for dissection is supplied by the College, although the students are encouraged to collect as much as possible. The required work in biology is finished with the Sophomore year, but to provide for the continuation of the work by those who desire to pursue its study further, elective work is offered in the Junior and Senior years.

Those students who expect to become farmers, physicians or naturalists, or who have a decided liking for Natural History studies, will thus have opportunity to continue their work in a line directly in accord with their tastes and future occupation in life and, at the same time, obtain the mental drill which is the chief object of a College training.

Elective work in either Botany or Zoölogy may be arranged to suit the taste, capacity and fitness of the student desiring it, and will consist mostly of laboratory work in Phænogamic Botany and Vertebrate Zoölogy.

Human Anatomy and Physiology.—Martin's "The Human Body, Briefer Course," is used as a text-book for this study during the first term of the Freshman year.

It is expected that, in this way, a student will become acquainted with the more important facts connected with the structure of the body, the form and uses of the various organs and the hygiene of the body.

CORNER OF BIOLOGICAL LABORATORY.

UNIVERSITY OF ILLINOIS

Illustrative material consisting of fresh or preserved specimens, skeletons and charts, is used whenever practicable.

Botany. Beginning with the second term of the Freshman year, the study of Botany is continued one year. In the first term most of the time is spent on the gross and microscopic structure of the higher plants. During the second term, when abundance of fresh material can be had, the structure and relationships of flowering plants are studied by means of specimens, of which written descriptions are required.

Some work with an analytical key is required, so that a student may be familiar with its use and gain a clear conception of the relations of plants to each other and their classification into species, genera and larger groups.

In the third term the study of flowering plants is finished and several typical specimens of cryptogams studied so that the student may know something of the life histories of these lower forms of plants.

A set of about 130 wall charts, a large number of mounted microscopic specimens and a herbarium, provide plenty of material for illustrating the various subjects as they come up for study.

A library of the more important reference works is kept in the laboratory and students are encouraged to use it.

The larger part of the time given to the study of Botany is spent in the laboratory, but this work is supplemented by the use of a text-book and some recitations or lectures.

Zoölogy. During the last two terms of the Sophomore year Zoölogy takes the place of Botany. As in the latter study, most of the time is devoted to laboratory work.

Selected types of the various classes of animals are dissected, and in this way the student becomes acquainted with animal structure by studying animals themselves, and the development of the faculties of observation and comparison is continued.

Invertebrate types are considered during the first term, and vertebrate forms in the second term.

Written records of work accomplished, illustrated by drawings are required of each student.

The laboratory is supplied with a collection of charts illustrating the invertebrates, and a set of mounted skeletons showing the variations in vertebrate forms. There is also a supply of disarticulated skeletons for use in class and compound microscopes in sufficient number so that each student has the use of one.

A collection of marine invertebrates obtained from the U. S. National Museum and other specimens of various kinds assist in giving some idea of the great variety of animal forms.

AGRICULTURE.

Three courses in Agriculture are offered, viz., a Four Years' Course leading to a degree, a Two Years' Course, and a Winter Course coincident with the regular winter term of the College.

The Four Years' Course, upon the completion of which the student receives the degree of B. S. is parallel with the other courses of the College.

The object of the course is to give young men a collegiate training by the use of those studies which are likely to be most beneficial to one engaged in any pursuit connected with Agriculture.

The training in this course is in every respect equal to that in any course in the College, and the opportunities in life, for graduates from it, are of the very best. Reference to the outline of the course on page, 21 will show that it has for its foundation those scientific studies upon which all sound agricultural knowledge is based, supplemented by certain special agricultural studies designed to connect the sciences with agricultural practice.

The course is intended to fit young men for farm superintendents or to fill any position where a knowledge of scientific agriculture is needed.

The Two Years' Course is for those who feel that they cannot give the time necessary for a four years course, and yet wish the foundation of a good English education, with some knowledge of the principles of Agriculture.

The Winter Course has been organized for the benefit of those who wish to make use of the comparatively leisure time of the winter season on the farm, by getting some systematic instruction upon topics directly related to farm life.

It is open to men or boys above sixteen years of age; no examination for entrance is required.

Since this course was arranged four years ago a number of young men have availed themselves of its opportunities and it is expected that as it becomes more widely known the numbers taking it will increase.

The instruction is largely given by means of lectures, but laboratory work and text-books are used to some extent.

The subjects considered are as follows:

Agricultural Chemistry,
Breeds of Live Stock,
Stock Breeding,
Stock Feeding,
Soils.
Manures and Fertilizers,
Dairying,
Veterinary Science,
Plant Diseases,
Agricultural Bacteriology,
Economic Entomology,
Horticulture,
Botany,
Drainage,
Shop Work,
Civics.

A circular fully describing this course will be sent upon application.

HORTICULTURE.

The instruction in horticulture is given during the winter term in a course comprising three lectures per week. The series of lectures is intended to give the latest information and methods connected with the underlying principles of commercial fruit culture. Among the subjects receiving special attention are:—orchard cultivation; pruning; the propagation of fruits; the spraying of orchards and small fruit plantations; the packing and marketing of fruits; cold storage; orchard machinery; the origin, improvement and selection of varieties. Opportunity for laboratory and as much field work as possible is given the students.

ENTOMOLOGY, ECONOMIC.

The course in entomology consists of one lecture per week during the winter term. The aim of the lectures is to consider insect life in its relation to horticulture and agriculture. The following features are prominently emphasized in the course: the increase of insect pests; our insect friends; their relationships; their external and internal anatomy, their life history; the applications of the preceding features to the prevention and destruction of insects; insecticides. A detailed account is given of the principal insects that attack fruit and farm crops, and specimens from the collection are placed before the students.

CIVIL ENGINEERING.

The object of the course of instruction in civil engineering is twofold; first, to fit those pursuing it previous to professional life to be, at graduation, immediately useful as assistants to engineers in charge of structures and works; second, to meet the needs of those who, having engaged, without a preliminary scientific training, in the work of the engineer, find themselves at a disadvantage. It is believed that these ends can most readily be attained by such training as will impart accurate knowledge of natural laws and of the properties of materials, and develop power to apply that knowledge intelligently in professional practice. Therefore, the technical studies are preceded by liberal and thorough instruction in the mathematical and physical sciences.

ENTRANCE REQUIREMENTS are fully stated on pages 12-14. In addition, knowledge of language and natural science as taught in our high schools will contribute much to the satisfactory progress of the student. In order that those pursuing this course may derive therefrom the greatest benefit, it is recommended that their mathematical preparation, in particular, be thorough.

DEGREES.—Each student who complies with all the rules of the College and satisfactorily completes this course is eligible to the degree, Bachelor of Civil Engineering, (B. C. E.). As a portion of his work in course he must prepare a written description, also such drawings as are necessary for its proper elucidation, of some structure, machine or process which he may have examined, designed or devised. The description must be written upon regulation paper. It and the necessary drawings, all of which will be retained by the College as its property, must be presented to the Professor in charge of the Department on or before the first day of May next preceding the time for the student's graduation. While throughout the preparation of this description students have the advice and aid of the Professor, in the first and second terms of the Senior year time is allowed in the course of instruction for working upon it under his immediate direction.

Each graduate who has been engaged for three years subsequent to his graduation in practical and successful work as an engineer, and who has prepared and presented to the Faculty at least six weeks before the June meeting of the Board of Trustees a satisfactory thesis on a topic related to his profession, is eligible to the professional degree, Civil Engineer, (C. E.). The thesis, with accompanying drawings, is retained by the College as its property.

Nature of Course.—Granting that the applicant is competent to select such a course of study as will lead to a desired end, the method of gaining such ends must depend upon such knowledge and experience as the applicant does not possess. The College allows, therefore, large opportunity for the satisfaction of individual choice by offering different well defined courses of study; but, particularly in the technical courses, prescribes the greater portion of the work.

On pages 26-27 is an outline of the subjects included in the course in civil engineering and of the amount of time allotted to each. As an aid to those contemplating the pursuit of the course, it is proposed here to set forth more definitely its nature and content, by describing in detail the scope and purpose of the different subjects therein. It is believed that all the preliminary studies will either directly or indirectly contribute to professional success.

Language.—The language group includes English, German and French. The business relations of the practicing engineer make it necessary that he be able to express himself properly in both spoken and written language. To this end, especially in the course in English, special attention is paid to composition under the eye of the teacher, and excellent facilities are afforded for gaining a knowledge of proper methods in public speaking and of parliamentary practice. The courses in German and French are especially designed to render accessible to the student the scientific and technical matter contained in books and periodicals in those languages.

Mathematics.—The mathematical course is full and thorough. Particular attention is called to the fact that it includes a very full course in mechanics both theoretical and applied;—in the Sophomore year an elementary general course;—in the Junior and Senior years an advanced course in mechanics of solids and hydromechanics, the latter including hydrostatics, flow through orifices, through tubes, in pipes and in conduits;—in the Senior year a course in mechanics of materials and of beams and columns. An engineering laboratory course on the properties and strength of materials illustrates and supplements the text-book and lectures.

Physics, Chemistry, Mineralogy, Geology.—In these subjects there are full courses, including appropriate laboratory and field-work, as elsewhere explained under the several heads. The course in chemistry includes lectures on the leading chemical industries, and full treatment of the metallurgy of iron and steel and the production of their commercial and structural forms.

Sanitary Science.—The instruction in this branch includes lectures and recitations on water, air, food, disinfectants, ventilation, heating and the disposal of sewage.

Steam Engines and Steam Boilers.—The course in these subjects is intended to familiarize the student with the names and uses of the parts of engines, boilers and pumps. In the management and running of engines and boilers practical instruction is given.

Surveying.—Text-book work and lectures in the Sophomore and Junior years include descriptions of the instruments used and the methods employed in land surveying, triangulation, topographical surveying and leveling, mining surveying, hydrographic surveying and city surveying. In the Junior year is included as much of mathematical astronomy as bears upon the work of the surveyor, an explanation of the methods employed in geodetic work and of the adjustment of observations by the method of least squares. Instruction in the class-room is supplemented by field-work, including, in the Sophomore year, land surveying with chain, tape, compass and transit, and elementary operations in leveling; in the Junior year topography with transit, level, stadia and plane table, precise measurement of lines and angles, and determination of latitude, azimuth and time; and in the Senior year railroad surveying.

Railroad Engineering.—This course, as prescribed, treats of the location and construction of railroads, illustrating in the class-room, the field and the drafting-room the operations and methods involved. Complementary to this course is that on Highways, including roads, streets and pavements, their location, construction and maintenance. The sources and manufacture of paving materials are described, the engineering laboratory aiding in the study of their properties.

Roofs and Bridges.—In lectures in the first and second terms of the Senior year the common forms of trusses are briefly described and their construction explained. The methods of determining the stresses in framed structures by both algebraic and graphic processes are fully set forth; the student, by solving many and varied illustrative problems, making constant application of the knowledge acquired.

Building Construction.—In this course it is proposed to treat particularly of wood and its use in construction, special reference being made to the framing of floors, partitions and roof

trusses. Also attention will be given to roofing, sheet metal work, paints and painting, with descriptions of the characteristics and properties of the materials used.

Masonry Construction.—This includes a treatment of masonry in general. The greater part of the time devoted to the subject will be given to railroad and bridge masonry and to the different kinds of foundation work for heavy structures.

Contracts and Specifications.—This course includes a presentation of the law of contracts, a treatment of the general features of engineering specifications with descriptions of the related documents and their uses, and of the common forms of business paper.

Drawing.—The course in drawing is thorough and complete. It includes lettering such as is used on working drawings, use of drawing instruments, geometrical constructions, instrumental copying of machine details, descriptive geometry with special attention to the method of making working drawings, perspective and isometric drawing, free-hand sketching of structural details and of machine parts, working drawings from the sketches, tracings and blue-prints from the drawings, tinting and shading, designing of static structures, topographic symbols, and plotting from field-notes.

Shop-Work.—This course is designed to train the eye and the hand, and to afford a knowledge of common tools and the modes of using them. It includes

(a) Bench-work in wood.—This includes descriptions of tools, and work with saw, plane, auger, bit, chisel and kindred tools in making joints, such as timber splices, mortises, tenons and mitres, and light cabinet work and models of roof and bridge trusses.

(b) Wood-turning.—This includes use of lathe tools in straight and compound turning in soft and hard woods, involving caliper work, hollow turning, turning to template, screw-plate and chuck work.

(c) Bench-work in iron.—This includes work on cast and wrought iron and brass,—chipping, use of file and scraper in producing flat and curved surfaces, fitting, slotting, dovetail work, screw-cutting with taps and dies, pipe-fitting.

Students who, previous to entrance, have satisfactorily completed such a course as that described, will have more advanced cources of shop-work assigned them.

The subjects described, with the three years' course in Mili-

tary Science and Tactics, constitute the prescribed portion of the course. Circumstances may make it desirable that students should have opportunity to prepare for special lines of work. To afford this, the electives in the second and third terms of the Senior year are offered. Each student must elect, in each term, one of the technical studies or a technical equivalent. The subjects selected should be properly related as are those with the same title in the two terms, those in railroad engineering and applied electricity, and those in hydraulics and pumps and hydraulic motors. As an aid to the student the following data concerning the electives is given:—

Railroad Engineering is extended to include maintenance of way, equipment, and a study of economic problems which arise in the location and operation of railroads.

Applied Electricity.—This course includes a study of the arrangement of plants for generating electricity for lighting and power, the erection of distributing lines, interior wiring, arc and incandescent lamps, motors and electric railways. The lectures are supplemented by visits to lighting and power plants.

It includes also the applications of electricity in connection with the telegraph and the telephone, and in domestic uses with bells, annunciators, gas-lighting and fire and burglar alarms.

Bridge Engineering.—This is a continuation of the course as prescribed, and includes the presentation and application of methods in actual use in the calculations for roof and bridge work, also a study of the principles involved and a description of the methods employed in the designing, constructing and erecting of framed structures. The lectures and text-book work are supplemented by visits to bridge works and to structures in course of erection.

Materials of Construction.—A course devoted to the study of the sources, manufacture and physical properties of materials used in construction. It includes a large amount of laboratory work and is designed to fit a student to be a useful assistant in a testing laboratory.

Building Construction.—This is a continuation and extension of the subject as previously presented, special attention being given to its engineering features, including those characteristic of mill-work and tall building construction. It is adapted to the needs of those who contemplate architecture or building as a vocation.

Water Supply, Sewerage.—The different systems in use are described and the conditions to which they are respectively adapted. The principles involved in their design are discussed and the engineering features involved in their construction are explained.

Hydraulics.—This is a course in measurement of water by orifices, flow over weirs, flow in rivers and measurement of water power.

Pumps and Hydraulic Motors.—This includes the study of both reciprocating and rotary pumps and of turbines, much of the time being devoted to the last. The course is closely allied to that on water supply.

Spanish will suggest itself as a study desirable for those contemplating a professional career in Central or South America.

Methods of Instruction.—Instruction is by text-book and lectures, by laboratory, drafting-room, field-work and shop-work, by the use of current professional journals, and by visits, followed by carefully prepared reports, to structures in process of erection, good types of finished structures, and industrial establishments.

The chief objects in all laboratory, field and shop-work are to secure mental discipline and to supplement the work of the lecture room by illustrating principles and impressing facts therein set forth. Without subordinating the true educational function of these branches, the work is so carried on as to give the student an intelligent preparation for similar work after graduation.

The visits of inspection and reports thereon are considered important aids in developing correct methods of observation and description and in forming acquaintance with engineering works.

Facilities for Instruction.—The Department is well supplied with the necessary instruments for laboratory and field-work. The shops are well equipped. All equipment is of the best quality and is being rapidly increased. The Department has a working library, kept up to date, containing standard works in all branches of civil engineering. It is supplied also with the leading professional periodicals named in the general library list on another page. In that list are named also scientific periodicals both American and foreign. To all the periodicals, and to the books in both departmental and general libraries, the students have constant access. They are offered every facility in the prosecution of their work.

The course is well organized throughout and in complete and successful operation. Many of the graduates are filling desirable positions as assistants in the different branches of professional work.

DEPARTMENT OF ELECTRICAL AND MECHANICAL ENGINEERING.

Description of Studies and Methods of Instruction.

Two courses are offered in this Department.

Mechanical Engineering, a four years' course leading to the degree of Bachelor of Mechanical Engineering.

Electrical Engineering, a four years' course leading to the degree of Bachelor of Electrical Engineering.

Each graduate of either of these courses will, after three years practical and successful work in his calling, be entitled to the professional degree of M. E. or E. E. according to the course he may have pursued.

Favorable opportunities for instruction are offered in these important departments of scientific and technical training. The rapid increase of our manufactures, requiring the economical utilization of all sources of power, and the design, and construction of much special machinery, open a broad field for the Mechanical Engineer, while Electrical Engineering, with its growing importance, the constantly increasing number of its applications and many possibilities, is a very attractive profession.

The courses in this Department are designed to teach the principles underlying Mechanical and Electrical Engineering, and to prepare young men to design, construct and supervise machinery and electrical apparatus, and meet successfully the problems which may arise in the practice of their profession.

In addition to the strictly technical studies, students receive instruction in the English language, Chemistry (including laboratory course, and metallurgy of iron and steel), Mathematics, Physics, German or French, together with a thorough course in Mechanics, comprising Mechanics of Solids, Mechanics of Materials, Hydromechanics, and Roofs and Bridges.

The Courses of Mechanical and Electrical Engineering are very closely allied, electric energy being now most economically developed by mechanical devices which require a motive power

furnished by some prime mover, so that the installation of an electric plant requires a large amount of mechanical knowledge.

The courses, therefore, are nearly identical for the first three years. In the Senior year they differentiate, each class pursuing separately those subjects pertaining to their particular branch, while some studies remain common.

The aim is to train men to unite correct theory with practical requirements. To accomplish this fully, much stress is laid on proficiency in the actual management and care of apparatus, much time being devoted to practical work.

For this purpose the Department is furnished with a well equipped Wood-working, Machine, and Black-smith Shop, and Electrical laboratory containing Motors, Dynamo, Storage Battery, and various testing instruments sufficient for a full course, new apparatus being added as necessary. Instruction is given under the following heads.

Drawing and machine Design.—This course extends through the whole four years, beginning with Lettering and Instrumental Drawing in the Freshman year, and includes instruction in Plain, Script and Ornamental Lettering. A course in Geometrical Construction, with such parts of Descriptive Geometry as bear directly on Mechanical Drawing, problems involving orthographic and isometric projection, and the intersection and development of surfaces are worked out on the drawing board. Such exercises are given, as will best render the student familiar with the use of the drawing instruments.

Followed by the copying of Machine detail, attention is paid to the conventional methods of representing metals, the proper dimensions of parts, and the need of different views, sections, etc., for clearness.

Tracings and blue prints are made for shop use. Free hand sketches of machines in the shops are taken, and from some of these complete detail drawings are made in the drafting room.

The use of water colors, tinting and shading with the conventional colors for wood, metal, etc., in machine construction are also taught.

In the Senior year machine design and the drawing of special machines are taken up.

Kinematics.—This includes a study of the transmission of motion by machine parts, such as clutches, belts, cams, screws, gearwheels, links, etc. The teeth of wheels are constructed and

velocity diagrams for the various motions are laid down, many problems being worked out on the drawing-board.

Graphical Statics of Mechanism.—The graphical methods of obtaining the equilibrium and efficiency of mechanisms are taught. The harmful resistances caused by friction are considered and numerous problems are worked out on the drawing-board.

Machine Design.—Some time is given to the *Materials of Engineering* after which the proper proportioning of screwed and keyed fastenings and the simpler transmission machinery is taken up. This is followed by the design of shop-tools or some special machine. Each class will, if possible, work out one or more designs and furnish working drawings and sketches of the details.

Steam Engine Design.—Each student is required to design the principal parts of a steam engine, calculating for strength, appearance, and cost of manufacture. Some of the details are fully worked out and working drawings for them are made. Lectures are given on the theory of compound and triple expansion engines and condensers.

Steam Boiler Design.—This includes value of fuels, efficiency of heating surfaces of types of boilers, size of parts, allowing for strength and corrosion, arrangement of flues and chimneys, of steam and feed pipes, and methods of setting. Students are required to calculate the parts of a steam boiler and to furnish drawings for a boiler and setting, from their own designs.

Electric Machinery Design.—After the theoretical and practical courses in Dynamo-Electric Machinery are completed, the knowledge gained is applied to the design of some piece of electrical machinery, each student being required to design parts of a dynamo, motor or transformer.

The Courses in Designing Machinery are intimately associated with the shop and laboratory courses and the work is carried on as nearly as possible like that of the Engineering Drawing Office. The Department is in possession of many working drawings of machine-tools, engines, boilers, etc., which have been generously given by many of the leading manufacturing firms. Constant reference is made to them, and to trade catalogues, a full set of which is kept in the Department.

PRIME MOVERS.

Steam Engines and Boilers.—This course, given in the Freshman year, is intended to familiarize the student with the names and uses of the parts of engines, boilers, pumps, etc., and

their attachments, and with their proper management. In addition to the text-book, trade catalogues and the technical journals are used to illustrate the more prominent types and to teach the modern methods of management. Practical instruction is given in running engines and boilers.

Valve Gears.—The action of valves is studied and the Zeuner diagram as applied to the Stephenson link, and to the radical and automatic cut-off gears. The ball governor is considered. Much of the work is done on the drawing board.

Thermodynamics.—This includes thermodynamics of gases, of saturated and superheated steam, with application to steam and gas engines and injectors.

Pumps and Hydraulic Motors.—Pumps, both reciprocating and rotary are studied, but the time is given chiefly to turbine wheels.

Transmission of Power.—This includes a study of the arrangement of machinery and methods of transmitting power, both mechanical and electrical. Visits are made to engineering plants in the neighboring cities, and written descriptions and sketches are required of the arrangement of the machinery, shafting, belting, etc.

Laboratory Courses in Steam Engineering.—Management of engines and boilers is first taught. Next follows measurement of weight, volume, area, temperature, etc., use of indicator, tests of pressure gauges, of quality of steam, power and efficiency tests of steam and gas engines, boilers, injectors, etc. The quality of lubricating oils, amount of friction, etc., is experimentally determined and the power used by machines is measured. *Hydraulic experiments* cover flow of water over weirs, through tubes, efficiency of pumps, etc.

electrical engineering.

As a preparation for these courses, a course in Elementary Electricity and Magnetism is given in the Junior year.

Electrical Measurements.—Classroom instruction includes construction and calibrations of testing instruments, the measurement of currents, potential, resistance, capacity, insulation, etc. Some time is given to Photometry.

Laboratory Work closely follows the classroom instruction. At first very close supervision is given to the work, that the correct methods of using the apparatus may be acquired, after which

the student is left more and more to his own resources in order that he may gain confidence in himself.

Direct Current Dynamo-Electric Machinery.—The laws of electro-magnets and of magnetic circuits are first studied and the principles are applied to dynamos and motors, the design and construction of the parts being taken up in detail. Attention is given to the characteristic curves and the efficiencies of the different types.

Alternating Current Machinery is next taken up, the design and construction of dynamos, motors and transformers being treated as in direct current work.

Laboratory Work.—After management of dynamos has been acquired, time is given to the electro-magnet and tests of reluctance, inductance, hysteresis and leakage are made. Characteristic curves and efficiencies are found for different type machines. On account of the growing inportance of storage batteries considerable time is given to their construction and management.

Applied Electricity.—A study is made of electricity as applied to domestic purposes, including electric bells, annunciator work, gas lighting, fire and burglar alarms, etc., electric telegraph and telephones. Electro-deposition of metals, including electro-plating, electro-typing and smelting and refining metal.

Electric Lighting and Transmission of Power.—A study is made of the arrangement of generating plants, erection of distributing lines and interior wiring on the different systems, arc and incandecent lamps, distribution of power to mills, etc., from central plants, electric railways, including lines, circuits, and motors with methods of control. This work is supplemented by visits of inspection to lighting and power plants and by constant reference to the current electric journals.

Laboratory Work includes wiring, testing of lines, lamps, etc., and general management of electrical apparatus.

SHOP-WORK.

The work in the shops is designed to teach the construction and use of tools and machines employed in mechanical work and as a preparation for the study of machine design in the Senior year. The shops are managed as nearly as possible like those of an actual manufacturing plant. In arranging the work care is taken that the class-room and shops may be mutually helpful. Thus, in wood-working, the technical names and reasons for the

different forms of joints, splices, frames, etc., constructed, are pointed out, and in the iron work the different fastenings, methods of locking nuts, etc., are constructed and explained. This method is followed throughout the course, while in the class-room reference is always made to the application in the shops of the principles discussed, drawings and descriptions being required if necessary.

Each student is required to complete a graded series of exercises in carpentry, wood turning, pattern-making, moulding, forging and machine-shop work, designed to make him, upon their completion, able to perform any ordinary operation in a workmanlike manner. Each class then more or less completely builds some machine as time will permit. All work is done from blueprints made by the students. Manual skill is desired and required and all work must be done in a manner satisfactory to the Instructor before it will be accepted. At the same time particular stress is laid on a thorough knowledge of the construction and care of each tool and machine, and the kind of work to which it is best adapted, together with the special work possible to perform on it. Combined written and oral examinations are held three times during the first term and twice during the second and third terms. These examinations cover the work of the terms and are extremely valuable in that they compel close attention to the instruction given and indicate to the Instructor the knowledge each student has failed to acquire, thus enabling him to give just such instruction as is needed.

The Courses in detail are as follows:

(a) Bench Work in Wood.—This includes the nature and use of tools, work with saw, plane, auger, bit, chisel and kindred tools, in making different joints, such as timber splices, mortises, tenons, mitres, dovetails, etc., frames, light cabinet work and roof and bridge trusses.

(b) Wood-turning.—Comprises use of lathe tools in straight and compound turning in soft and hard woods, involving caliper work, hollow turning, turning to template, screw plate and chuck work.

(c) Iron and Steel Forging.—This includes exercises in heating, bending, upsetting, welding; the making and tempering of punches, chisels, machine-cutting tools. Brief instruction is given in soldering, brazing and riveting.

(d) Bench Work in Iron.—This comprises work on cast iron, wrought iron and brass,—chipping, use of file and scraper in producing flat and curved surfaces, fitting, slotting, dovetail work, screw-cutting with taps and dies, pipe-fitting.

(e) Machine Work in Iron.—This includes straight and taper turning, facing and screw cutting on lathe, drilling and boring on lathe and drill press, surfacing, straight, spiral, end and gear cutting on milling machine, planing, reaming, grinding, polishing, etc.

After the regular series of exercises in iron work is completed further practice is given in the building of apparatus and complete machines from designs and drawings made at the College.

(f) Pattern Making and Moulding.—A series of patterns including patterns for pipe joints, valves, couplings and pillow-blocks, etc., is first completed and by means of these the actual process of moulding is illustrated. More complex patterns and patterns for actual machines to be constructed in the shops are then made and during the last term of the Senior year the students construct patterns from their own designs and drawings.

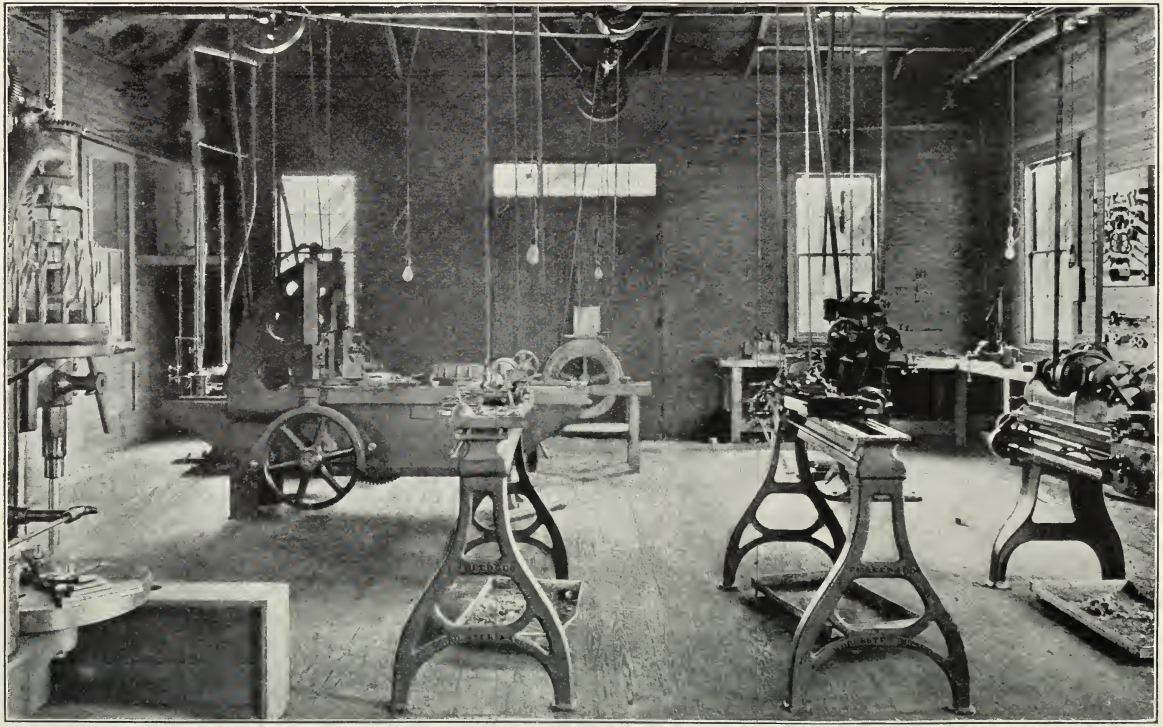
(g) Fitting, Erecting and Aligning Machinery and Shafting.—This course is given during the Senior year.

(h) Visits of Inspection.—Visits of inspection are made each year to manufacturing plants in nearby cities, and notes and sketches made of the arrangement of shops and machinery, special tools and processes and the methods of carrying on work.

(i) Special Course for Agricultural Students.—This course is adapted especially to the needs of agricultural students and includes in wood—use and care of tools, general carpentry, joints, timber splices, framing; in iron—forge work, including heating, bending, welding, making and tempering of tools, soldering, riveting, and bench work, including chipping and filing, screw-cutting with taps and dies. Practical instruction is given in managing engines and boilers.

MILITARY SCIENCE AND TACTICS.

By the Act of Congress, July 2d, 1862, establishing colleges for the benefit of Agriculture and the Mechanical Arts, military science and tactics become a part of the work of instruction. All Students not in the Senior class are required to take military



END OF MACHINE SHOP.

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instruction and drill, unless specially excused by the Faculty on account of physical disability or because of conscientious scruples on the part of their parents.

In Delaware College the military instruction and drill are in charge of an officer of the regular army. The course of instruction is both theoretical and practical.

The theoretical instruction, one hour a week, is confined to the winter term.

The first year's course consists of the Drill Regulations of the three arms of the U. S. Army, so far as each pertains to the practical instruction given in that arm.

The second year's course embraces "Notes on Military Science and the Art of War," and the preparation of the usual reports and returns pertaining to a company.

Lectures on military subjects are delivered throughout the year to those taking the course.

PRACTICAL INSTRUCTION EMBRACES

1. Military Gymnastics and Athletics.

2. Infantry.—The School of the Soldier, the Company and the Battalion, including the ceremonies of guard mounting, dress parade, reviews, and inspections.

3. Artillery.—The School of the Soldier dismounted, manual of the piece, etc.

4. Signaling.—Transmission of messages by means of flags.

The National Government supplies all arms, ammunition and equipments; and the College, all military text-books. The only expense incurred by the student in taking this course is his uniform. The uniform adopted is a cadet gray,—strong, neat and serviceable,—costing from $13.50 to $16.50.

LIBRARIES.

The libraries contain about 7000 volumes, each department of instruction having its own, kept under the immediate supervision of the Professor and available to students for reference.

Besides these technical libraries there are two general collections of books, one of which containing the newest and most important works in history, literature, economics, etc., is kept in the reading room under the charge of the College Librarian. It is classified on the Dewey system, and a card catalogue on the dictionary plan is in progress.

Students may draw books from any of these libraries, under proper restrictions. New books are continually being added so that the collections may fairly represent current work in all subjects.

READING ROOM.

On the second floor of the Recitation Hall a large well-lighted room is given up for a reading room and general library. Ample seating capacity is provided for as many students as may wish to use the room at any time, and the following list of periodicals will show the character and scope of the literature provided.

The best of the publications are preserved on the library shelves and become valuable for future reference.

Educational Review.
School Review.
Educational News.
Education.
Journal of Education.
Forum.
North American Review.
Review of Reviews.
Critic.
American.
Outlook.
Nation.
Fortnightly Review.
Contemporary Review.
Nineteenth Century.
Athenaeum.
Saturday Review.
Weekly Times. (London.)
Punch.
Revue des Deux Mondes.
Journal des Debats.
L'Illustration.
Le Monde Illustré.
Illustrirte Zeitung.
Book Reviews.
Scientific American Supplement.
Popular Science Monthly.
Sanitarian.
Nature.

Science.
American Naturalist.
Popular Astronomy.
Journal of the Society of Arts. (London.)
Farmers' Voice.
American Grange Bulletin.
Practical Farmer.
Agricultural Epitomist.
Musical Record.
Advocate of Peace.
Double Cross.
Presbyterian.
Peninsula Methodist.
Delaware Churchman.
Harper's Weekly.
Harper's Monthly.
Scribner's.
Century.
Atlantic.
McClure's.

Besides these publications which are open to students at all times, each department has several technical journals available to those interested. The list of these journals follows:

Journal D' Agriculture Pratique.
Annales Agronomiques.
Physical Review.
Astro-Physical Journal.
Zeitschrift für Physikalischen and Chemischen Unterricht.
Zeitschrift für Instrumenten-kunde.
Annalen der Physik und Chemie.
Philosophical Magazine.
American Mathematical Journal.
Annals of Mathematics.
Mathematical Gazette.
American Mathematical Monthly.
Bulletin of the American Mathematical Society.
Railroad Gazette.
Engineering Record.
Engineering News.
Engineering Magazine.
Architecture and Building.

Home Study Magazine.
Municipal Engineering.
Digest of Physical Tests.
Proceedings of American Society of Civil Engineers.
Journal of the Association of Engineering Societies.
Wisconsin Engineer.
L'Electricien.
Electrical Engineer.
Western Electrician.
Electrical World.
Engineering.
Power.
American Machinist.
Scientific American.
American Journal of Science.
Journal of the London Chemical Society.
Proceedings of the Royal Society.
Proceedings of the Royal Institution.
Engineering and Mining Journal.
Zeitschrift für Krystallographie und Mineralogie.
Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege.
Neues Jahrbuch für Mineralogie, Geologie und Paleontologie.
Tschermak's Mineralogische und Petrographische Mittheilungen.
Meyer's Jahrbuch der Chemie.
Jahres-bericht für Hygiene.

GENERAL REMARKS.

Apparatus.—The various scientific departments of the College are well equipped with modern apparatus of the most approved form, and additions are made as the needs of instruction and advances of science demand.

Laboratories.—The several scientific departments have large, well lighted laboratories supplied with water and gas, and furnished with ample equipment of apparatus and appliances. The importance of laboratory work in scientific study is duly recognized, and the instruction is greatly enriched in effectiveness and increased in disciplinary value.

The Work-Shops.—The work-shops contain iron-and wood-working tools sufficient for a thorough course in the best modern

shop practice. There are also housed in the shops, engines, dynamos, motors and other necessary appliances for mechanical and electrical testing and measurement.

Mineralogical Cabinet.—The College possesses valuable geological and mineralogical collections systematically arranged and readily accessible for use.

Natural History Collections.—The College already has the nucleus of a Museum of Natural History, in the shape of the collections of invertebrates and skeletons, mentioned under Zoölogy.

In addition to this material it has several Auzoux models illustrating different forms or parts of animals.

In order that these collections may be increased and thus become more valuable to all connected with the institution, we request the friends of the College who may come into possession of specimens suitable for a museum to correspond with us relative to their preservation. It is especially desirable for us to build up a museum which shall contain representatives of all animals and plants found wild in Delaware.

Department Libraries.—Each department of the College possesses a special library of standard books and journals under the immediate care of the professor in charge. These libraries are open to the students at all times during College hours.

Visits to Manufactories.—Opportunities will be given each year for students to visit the excellent manufacturing establishments of Wilmington, Chester, Baltimore and Philadelphia, when they, in company with a competent professor, may witness and study the practical application of science, as illustrated in the most successful manufactories in the country.

State Chemist.—The professor of Chemistry in the College is by Legislative Enactment Ex-officio State Chemist for Delaware.

EXAMINATIONS.

Examinations in all subjects are held at the close of each term and are conducted either in writing, or orally, as the nature of the subject may require or as the professor may prefer. Review examinations are also held at other times whenever, in the judgment of the professor, the objects of instruction may be promoted by such means. The examinations are designed not as mere tests of the student's knowledge, but as a valuable training in rapid, concise and accurate expression. They serve as a valuable

means of giving the student a ready command of his mental powers and, by encouraging a review of a period of work, they give him a broader view and a firmer hold of a subject.

In determining a student's fitness to proceed to a higher class great weight is given to the character of his performance of recitation room duties. The results of the term examinations are combined with the recitation records, but in fixing the student's standing the quality of his recitation work is the weightier factor.

In the case of failure to pass in any study, the student must satisfy the professor in charge that he has made up his deficiency before the condition can be removed. Reasonable opportunities will be given him to show by examination that he has qualified himself to take good standing in the subject in which he was found deficient.

If at the beginning of any year a student's record of the preceding year shows that he is deficient in too many subjects to maintain his class standing he will not be advanced, but will be required to go over the work in which he has failed. If such condition is brought about by idleness and neglect, change of habit or withdrawal from the College will be required. Every encouragement will be given to the willing and earnest student, but his best interests demand that he shall not undertake what he is not prepared to perform.

Reports.—At the close of every term a report of each student's combined recitation and examination record will be sent to his parent or guardian. These reports show the course of study the student is pursuing and the class in which he is enrolled. Parents are urged to give them close attention and to co-operate with the faculty in correcting habits of idleness and indifference when the reports indicate any lack of attention to duty.

Attendance.—Students are required to be regular in attendance upon College duties.

Any student who does not return punctually at the opening of a term must present a satisfactory excuse, in writing, from his parent or guardian, and sustain an examination in the studies pursued by his class during his absence. The same rule applies to such as lose a part of their course by absence during the term unless specially excused by the Faculty.

Students are required to occupy such rooms as may be assigned to them by the President, and are not allowed to remove without his permission.

Religious Instruction.—The College is in no sense sectarian, but every student is expected to attend public worship at least once each Sunday at such place as the parent or guardian may select. All the students, except such as reside at too great a distance, are required to be present at the daily morning prayers.

Government.—Discipline is administered by the Faculty. The government is mild but firm. Sound principles of morality are inculcated, and sentiments of manliness, honor, and self-respect are impressed upon the students. Misbehavior is reprimanded privately, and for gross disorder the parent or guardian is notified and requested to remove the offender. Suspension or expulsion is the last resort.

Students are not allowed to visit saloons or other places of resort that might injuriously affect their morals.

Under ordinary circumstances students will not be permitted to visit neighboring cities and towns without the permission of their parents or guardians, or of the President of the College. Permission granted by parents or guardians must be written and deposited with the President.

Every student, upon entering the College is furnished with a printed copy of the laws and regulations for the government of the institution.

EXPENSES.

	1st Term.	2d Term.	3d Term.
Tuition	$24.00	$18.00	$18.00
Fuel for Oratory and Recitation Rooms	1.00	.75	.25
Janitor's fee for care of Recitation Rooms, etc	1.50	1.25	1.25
Use of Library	1.00	.75	.75
Incidental Expenses	1.00	.75	.75
Total for Students not rooming in College	$28.50	$21.50	$21.00
" " those having Free Scholarships	4.50	3.50	3.00

EXTRAS FOR STUDENTS ROOMING IN THE COLLEGE.

Room Rent	$ 4.00	$ 3.00	$ 3.00
Heat for Rooms	4.00	3.00	1.00
Janitor's Wages for care of Rooms	1.50	1.25	1.25
Total for Students rooming in the College	$38.00	$28.75	$26.25
" " those having Free Scholarships	14.00	10.75	8.25

TUITION IS FREE FOR ALL STUDENTS FROM DELAWARE.

In addition to the foregoing charges, each student, upon entering the College, will pay $5.00 as an entrance fee.

Students in Chemistry are charged a fee of $2.50 a term for such articles as are consumed in making experiments.

The students rooming in the College dormitory have formed an association, in which table board is furnished at less than $3.00 a week.

Room furniture, including bedstead, mattress, bolster, washstand, study-stable and chairs is rented to students at the rate of $3.00 a year for the use of the furniture when two room together, or $5.00 a year when the student rooms alone. Students may furnish their own rooms if they prefer. They provide for themselves lights, books, and stationery.

PAYMENT.—College bills for each term are due and payable in advance. In case of prolonged absence from sickness, casualty, or other sufficient cause, a proper amount of the term payment will be refunded to the student.

Damages are assessed on the perpetrators if discovered; otherwise on all students.

All arrearages must be paid or provided for before a graduating student receives his diploma.

Degrees conferred at the Annual Commencement held June 17th, 1896.

HONORARY DEGREES.

Doctor of Laws.

The Hon. Charles B. Lore,
The Rev. Thomas M. Cann.

GRADUATE DEGREES.

Master of Arts.

The Rev. Francis Burgette Short, B. A., 1891.
William Washington Knowles, B. A., 1893.

Master of Science.

William Mathews Ogle, Ph. B., 1878, M. D. (Jeff.)

Civil Engineer.

Alexander Jenifer Taylor, B. C. E., 1893.
Julius Hermann Wolf, B. C. E., 1893.

Bachelor of Arts.

Albert Seth Cooper,
William Henry Cooper,
Alfred Lee Ellis, B. C. E., 1893,
George McIntire,
Edwin Compton Reybold,
Edward Lawrence Smith,
William Owen Sypherd.

Bachelor of Science.

William Burton Jester.

Bachelor of Civil Engineering.

Harry Draper.
John Thomas Henderson,
Clarence Albert Short.

Bachelor of Electrical Engineering.

Frank Harman Hynson, B. M. E., 1895.
Robert Bunsen Wolf.

STUDENTS IN 1896-97.

GRADUATE STUDENT.

NAME.	COURSE.	RESIDENCE.
Smith, Edward Lawrence	Lang. and Nat. Sci.	Newark.

UNDERGRADUATE STUDENTS.

SENIOR CLASS.

NAMES.	COURSES.	RESIDENCES.
Burnite, James Kilgore	Lat. Sci.,	Newark.
Conner, Samuel Lucas	Classical,	Wilmington.
Cooch, Levi Hollingsworth	Special Ag.,	Cooch's Bridge.
Ellis, William	Classical,	Delmar.
Henry, George Griffith	Elect. Eng.,	Newark.
Phillips, Edwin Terry	Elect. Eng.,	New Castle.
Pierce, Ira Liston	Gen. Sci.,	Wilmington.
Sipple, Ernest Waitman	Lat. Sci.,	Frederica.
Willis, Lee Omahundro	Mech. Eng.,	Newark.

JUNIOR CLASS.

NAMES.	COURSES.	RESIDENCES.
Baldwin, William Ray	Special,	Elkton, Md.
Brewster, Joseph Fergus	Lat. Sci.,	Chester, Pa.
Chipman, John Emory	Lat. Sci.,	Laurel.
Constable, Henry Lyttleton	Special,	Elkton, Md.
Craig, James Vance	Elect. Eng.,	St. Georges.
Davis, George Norton	Lat. Sci.,	Laurel.
Folk, George Edgar	Classical,	Wilmington.
Gamble, Harry Pritchard	Mech. Eng.,	Newark.
Good, David Daniel	Elect. Eng.,	Osceola Mills, Pa.
Hellings, Edmund Spenser	Lat. Sci.,	Wilmington.
Krause, Edwin	Elect. Eng.,	Osceola Mills, Pa.
Morris, Hugh Martin	Lat. Sci.,	Greenwood.
Mullins, John Timothy	Lat. Sci.,	Faulkland.
Pratt, Louis Lockwood	Elect. Eng.,	Milford.
Springer, Lewis Reese	Civil Eng.,	Wilmington.
Tosney, Emmet Lawrence	Elect. Eng.,	Delaware City.

SOPHOMORE CLASS.

NAMES.	COURSES.	RESIDENCES.
Armstrong, Howard Malcolm	Lat. Sci.,	Cooch's Bridge.
Baynard, Samuel Harrison	Lat. Sci.,	Wilmington.
Baxter, Thomas George	Special,	Slaughter.
Brennan, Homer	Special,	Philadelphia, Pa.
Brown, Joseph West	Elect. Eng.,	Odessa.
Du Hadway, Louis	Lat. Sci.,	Cambridge, Md.
Garland, Hugh Alfred	Special,	Wilmington.

NAMES.	COURSES.	RESIDENCES.
Green, Harold	Mech. Eng.,	Middletown.
Harrington, John Thomas	Civil Eng.	Wilmington.
Johnson, Everett Clarence	Lat. Sci.,	Selbyville.
Lewis, Charles Edwin	Elect. Eng.,	Newark.
MacSorley, Frank Olin	Lat. Sci.,	Newark.
Marshall, Andrew Donnell	Classical,	Milford.
Mason, Roger Owen	Lat. Sci.,	Newark.
McCabe, Edward Henry, Jr.,	Lat. Sci.,	New Castle.
McCabe, Harley King	Lat. Sci.,	Selbyville.
Medill, George Lodge	Lat. Sci.,	Newark.
Reed, Richard Paul	Civil Eng.,	Wilmington.
Stewart, James Lamont	Lat. Sci.,	Newark.
Vickers, George	Special.	Chestertown, Md.
Vickers, Harrison Wilson, Jr.,	Classical.	Chestertown, Md.
Wells, George Harlan	Lat. Sci.,	Elkton, Md.
Wood, Willard Franklin	Mech. Eng.,	Newport.
Woodall, Edward, Jr.,	Civil Eng.,	Royal Oak.

FRESHMAN CLASS.

NAMES.	COURSES.	RESIDENCES.
Ayars, Edward James	Lat. Sci.,	Wilmington.
Conner, William Henry	Lat. Sci.,	Wilmington.
Constable, Reginald	Classical,	Elkton, Md.
Crum, Ralph Day	Lat. Sci.,	Wilmington.
Duncan, Herman Franklin	Special Ag.,	Marshallton.
Hartman, Alfred Hanson	Civil Eng.,	Wilmington.
Hirsh, William Louis	Elect. Eng.,	Osceola Mills, Pa.
Hyland, Charles Scott	Civil Eng.,	Wilmington.
MacSorley, James Roe	Lat. Sci.,	Newark.
Maier, Harry Ludwig	Civil Eng.,	Wilmington.
Marvel, Andrew	Lat. Sci.,	Georgetown.
McKeon, Thomas Becker	Elect. Eng.,	Newark.
Nivin, Thomas Rankin	Lat. Sci.,	Strickersville, Pa.
Reybold, Henry Wilson	Elect. Eng.,	Delaware City.
Sentman, Jacob Elmer	Lat. Sci.,	Newark.
Sharp, Hugh Rodney	Lat. Sci.,	Lewes.
Tinney, William Scott	Lat. Sci.,	Newark.
Trotter, West Alexander	Lat. Sci.,	Wilmington.
Vansant, Harvey Lee	Civil Eng.,	Highlands.
Walter, Ebe	Special,	Frankford.
Woodward, George Daniel	Elect. Eng.,	Wilmington.

SHORT COURSE IN AGRICULTURE.

NAMES.	RESIDENCES.
Blackburn, James Frank	Wilmington.
Moore, Elias	Hockessin.
Sillitoe, Bennie Booth	Newport.
Slack, Norris Barnard	Strickersville, Pa.
Sullivan, James Augustine	Iron Hill, Md.
Webb, Carlisle Allen	Dover.

MILITARY ORGANIZATION.

Commandant of Cadets.

First Lieutenant W. H. GORDON, 18th U. S. Infantry.

COMPANY A.	COMPANY B.
Captain,	Captain,
E. T. PHILLIPS.	WILLIAM ELLIS.
1st Lieutenant,	1st Lieutenant,
G. HENRY.	L. PRATT.
2d Lieutenant,	2d Lieutenant,
S. CONNER.	
1st Sergeant,	1st Sergeant,
J. V. CRAIG.	L. SPRINGER.
Sergeants,	Sergeants,
J. E. CHIPMAN,	J. T. MULLINS,
G. N. DAVIS,	J. F. BREWSTER,
W. R. BALDWIN.	E. S. HELLINGS.
Corporals,	Corporals,
E. JOHNSON,	G. MEDILL,
E. MCCABE,	R. REED,
L. STEWART.	J. BROWN.

The Alumni association meets annually at the College, on commencement day, gives an annual banquet at Wilmington, and offers prizes for contestants in oratory. The officers of the association for the year 1896-'97, are :

President,—LEWIS C. VANDEGRIFT, ESQ.

Secretary and Treasurer,—PIERRE BLAIR PIÉ.

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FRONT VIEW OF DELAWARE COLLEGE.

CATALOGUE

OF THE

OFFICERS AND STUDENTS

OF

DELAWARE COLLEGE,

NEWARK, DELAWARE,

FOR THE YEAR 1897-98.

AND ANNOUNCEMENTS

FOR THE YEAR 1898-99.

THE JOHN M. ROGERS PRESS,
WILMINGTON, DEL.,
1898.

CALENDAR, 1898.

June 6–13—Annual Examinations.
June 12—Baccalaureate Sermon, 8 p. m.
June 13—Class Day Exercises, 2.30 p. m.
Oratorical Contest, 8 p. m.
June 14—Annual Meeting of the Board of Trustees, 11 a. m.
Anniversary of the Athenæan Literary Society, 8 p. m.
June 15—Commencement Exercises, 10.30 a. m.
Meeting of Alumni, 2.30 p. m.
Exhibition Drill, 4 p. m.
Anniversary of the Delta Phi Literary Society, 8 p. m.
June 17–18—Examinations of Candidates for Admission.

SUMMER VACATION.

FALL TERM.

Sept. 13–14—Entrance Examinations beginning 10 a. m., Tuesday, September 13th.
Sept. 15—Thursday 8.50 a. m., College Work begins.
Dec. 19–23—First Term Examinations.
Dec. 23—Friday, First Term ends.

WINTER VACATION.

WINTER TERM, 1899.

January 3—Tuesday, 8.50 a. m., Second Term begins.
March 27—Monday, 11 a. m., Meeting of the Board of Trustees.
March 27–30—Second Term Examinations.
March 30—Thursday, Second Term ends.

SPRING RECESS.

SPRING TERM.

April 4—Tuesday, 8.50 a. m., Third Term begins.
June 12–19—Annual Examinations.
June 18—Sunday, Baccalaureate Sermon.
June 19—Monday, Class Day Exercises.
Oratorical Contest.
June 20—Tuesday, Meeting of the Board of Trustees.
Anniversary of the Athenæan Society.
June 21—Wednesday, Commencement Exercises.
Meeting of the Alumni.
Anniversary of the Delta Phi Literary Society.

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DELAWARE COLLEGE.

DELAWARE COLLEGE is situated at Newark, a quiet, well-ordered, and hospitable village of fifteen hundred inhabitants in the North-western part of the State. Newark is connected with Philadelphia, Wilmington, Baltimore and Washington by the Pennsylvania, and Baltimore and Ohio railroads and there are few points in Delaware or in the Peninsular counties of Maryland distant from the Village more than four hours by rail. The region about Newark is one of the most healthful and beautiful on the Atlantic slope, and the site of the College, near the center of the town, is one of unusual charm. The village has a supply of excellent water and is lighted by electricity.

Delaware College was chartered in 1833 by Act of the Delaware Legislature, and the doors of the College were first opened to students in May of the following year. The College had been doing for a quarter of a century an important work not only for Delaware, but as well for neighboring parts of Pennsylvania and Maryland, when by a series of misfortunes, she was forced in the Spring of 1859 to close her doors.

Eleven years later the College was resuscitated, having meanwhile been designated by Act of the Delaware Legislature as a beneficiary under the Act of Congress apportioning to each of the several States large areas of public lands to form the basis of endowments for Colleges, especially devoted to the teaching of Agriculture and the Mechanics Arts, and Military Tactics. This Act of Congress commonly known as the "Morrill Bill" from its originator, Senator Morrill, of Vermont, declares that the Colleges made beneficiary under its provisions shall have as their leading object, "without excluding other scientific and classical studies and including Military tactics, to teach such branches of learning as are related to Agriculture and the Mechanic Arts * * * * * * in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." In consideration of the adoption and establishment of Delaware College as the institution to be provided by the State of Delaware in accordance with the provisions of the Act of Congress in question "a joint and equal interest in the grounds, buildings, libraries and vested funds of the College proper" was conveyed to the State of Delaware and equal representation upon the Board of Trustees was given the State.

RECITATION HALL.

LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

The Board of Trustees, when full, consists of fifteen members representing the original Board, and fifteen members on the part of the State appointed by the Governor, five from each of the three counties. The Governor of the State and the President of the College are members *ex-officio.*

In 1889, by Act of the Delaware Legislature, the Delaware College Agricultural Experiment Station was established in connection with the College under the provisions of an Act of Congress approved March 2, 1887, commonly known as the "Hatch Bill," appropriating $15,000 annually for the purpose of "acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture and to promote scientific investigation and experiment respecting the principles and applications of Agricultural science under direction of the College or Colleges established in each of the States and Territories" in accordance with the provisions of the "Morrill Bill."

Delaware College is beneficiary also under a further Act of Congress, known as the "New Morrill Bill," approved August 30th, 1890, which appropriated for the year then current $15,000 to each State for the "Land Grant Colleges" and provided for the increase of the appropriation by $1,000 each year until it should reach $25,000 a year. Delaware College receives annually four fifths of this appropriation, one fifth, in accordance with the provisions of the bill, being applied to the maintenance and support of the College at Dover for the education of colored students.

The appropriations provided for in this act are to be applied "to instruction in Agriculture, the Mechanic Arts, the English Language and the various branches of mathematical, physical, natural and economic sciences with special reference to their applications in the industries of life, and to the facilities for such instruction."

Stimulated by the increased income provided by this last Act, Delaware College has within the past six years enlarged her corps of instructors and greatly increased her equipment of apparatus and appliances, so that she is now vastly better able than ever before in her whole history to perform her appointed duty.

The buildings of the College, situated in an ample and beautiful campus, shaded by trees as old as the institution itself, consist of the Dormitory, a large brick structure which was originally the sole College building, and is still occupied in part by

laboratories, the old library, the literary societies and recitation rooms; Recitation Hall, a handsome brick building erected by the State in 1891; the wood-working shop and the machine shop,* also recently provided by the State, where are housed machinery and apparatus for a thorough practical course of instruction in the mechanic arts; the gymnasium and drill hall, which is amply equipped for indoor physical exercise.

The Experiment Station occupies a building on the College grounds which contains offices, libraries and laboratories of the station workers. The Station has also a large green-house, with laboratory adjoining, in the rear campus, and several buildings used for storage and other purposes in the conduct of the various lines of experimental work.

A considerable part of the rear campus is occupied as an athletic field and it affords excellent facilities for out-door sports and games.

The College buildings are heated by steam and are supplied with water by the town Water Works.

Tuition is free to all students from the state of Delaware, and the College thus constitutes a part of our system of free public instruction. She places within reach of the young men of the State a thorough collegiate training with no other cost than that of living and the provision of necessary books and a few inconsiderable fees to cover expenses incurred by the institution. Her work is laid out upon broad lines, and the culture of liberal learning and the practical usefulness of the applied sciences are equally emphasized in her scheme of education. While in pursuance of the special aims of her organization, stress is laid upon those departments which build up good citizenship and useful manhood, the place so wisely provided in the foundation of the "Land Grant" Colleges is given to the refining graces and amenities of the older learning.

Literary Societies.

Two Literary Societies, each nearly as old as the College, are not only important adjuncts to the social life of the institution but extremely valuable aids in its educational work. The Athenaean and Delta Phi Societies occupy a place midway between the literary societies of some larger colleges and the Greek Letter

*These buildings were destroyed by fire April 26. They will be rebuilt and equipped before the opening of the College Year 1898-99.

fraternities now widely extended throughout the college system of the United States. The two societies at Delaware College preserve the useful exercises common to most literary societies, and at the same time are strongly marked with the spirit of enthusiastic loyalty and brotherhood characteristic of the Greek Letter fraternities. There has never been a time when the Societies did not command the respect and enthusiasm of the undergraduates, and it is the uniform testimony of graduates that the Societies stood to them during their course as among the most important and valuable influences of the College. Each Society has a comfortable hall in the College dormitory, and each has a well chosen library covering the ground of general literature, history, biography, and popular science.

The Athenæan Literary Society, according to the testimony of its founders, was founded, December 18, 1834, about six months after the opening of the College. The Society's first constitution was adopted in February 1835, and the Society was incorporated by Act of the Delaware Legislature dated February 11, 1881.

The Delta Phi Literary Society, which claims for itself somewhat greater age than its rival, was legally incorporated January 12, 1835. The Society obtained a new charter from the Legislature of Delaware about 1871, and another in 1895.

Both Societies are in a flourishing condition, and so excellent is the influence of these organizations that the Faculty earnestly counsels every student to connect himself early in his course with one or the other.

Courses of Study.

The following courses of study leading to a degree are offered by the College.

1.—The *Classical Course*, leading to the degree B. A.

2.—The *Latin Scientific Course*, leading to the degree B. A.

3.—The *Agricultural Course*, leading to the degree B. S.

4.—The *General Science Course*, leading to the degree B. S.

5.—The *Civil Engineering Course*, leading to the degree B. C. E.

6.—The *Mechanical Engineering Course*, leading to the degree B. M. E.

7.—The *Electrical Engineering Course*, leading to the degree B. E. E.

There are offered, besides, a two years Course in Agriculture, not leading to a degree, and a short Winter Course in Agriculture covering the time of the Second Term.

Course 4 has been arranged for such students as may desire liberal training in Language and Science, but may not care to take the Latin of Course 2, or the Agriculture of Course 3.

In some of the Courses a considerable degree of freedom of election of subjects is permitted in the Junior and Senior years with a view of enabling students, who have determined upon their life-work, so to shape their undergraduate course as best to prepare them for the work of their chosen calling. The very nature of some of the Courses, notably those in engineering, precludes any great amount of elective freedom, but in the Senior year of these Courses opportunity is offered for advanced study along special lines. The great variety of Courses offered practically secures all the advantages of an elective system, while their largely prescribed form assures a broad foundation of general and liberal education. In all of the Courses, even in those that lead to immediately practical ends, the purely educational side of College life has been distinctly kept in mind.

In the assignment of the honors of the graduating class the Courses are of equal rank.

Requirements for Admission.

Candidates for admission to the Freshman Class must be at least sixteen years of age.

In all cases they must give satisfactory evidence of good moral character; and, when coming from another institution, they must present a certificate of honorable dismissal.

For entrance to the Course in Agriculture and Science, the General Science Course, and the several Engineering Courses, candidates must pass a thorough examination in English, History of the United States, American Literature, Geography, Arithmetic, Algebra through Quadratics, and plane Geometry.

Candidates for admission to the Latin Scientific Course must sustain an examination in Latin Grammar and Reader, Cæsar, and Vergil, in addition to the subjects mentioned above.

The requirements for admission to the Classical Course include besides the foregoing subjects, Physiology, Greek Grammar, and the first two books of Xenophon's Anabasis.

Examinations are not required of candidates from schools that have courses of study fully covering our entrance requirements, when it is ascertained that the instruction given in such schools

really fits students for undertaking the work of the College. Candidates from schools to which this privilege is granted are required to present a certificate from the Principal, setting forth in detail the nature and extent of the work accomplished. Upon application by the Principal of any school from which students are received in this manner, the College furnishes blank forms for certificate.

Detailed Explanation of the Requirements For Admission.

English.

Candidates for matriculation will be expected to show a fair knowledge of technical grammar, and to be able to express themselves in writing with reasonable accuracy as to spelling, punctuation and rhetorical form.

They will be expected to give evidence of acquaintance with Washington Irving's Sketch Book, Edgar Allan Poe's Tales, Nathaniel Hawthorne's Wonder Book, and Mosses from an old Manse, and the best known short poems of William Cullen Bryant, Henry Wadsworth Longfellow, Oliver Wendell Holmes, and John Greenleaf Whittier, together with the chief events in the lives of these authors.

Young men preparing to enter the College are advised, in case they have not access to the complete works of the authors named, to consult some trustworthy bookseller with a view to obtaining in cheap form the masterpieces of American Literature, and those charged with the duty of preparing young men for the College are urged to use as reading exercises in the advanced classes, selections from the works of the authors named.

United States History.

A good knowledge of the History of our country as contained in the ordinary text-books used in the schools is required.

Geography.

Candidates should show a fair knowledge of physical and political geography as given in the larger school geographies.

Arithmetic.

Thorough preparation in arithmetic is necessary for beginning the work of any of the regular courses. Candidates are required

to pass an examination upon the whole of higher arithmetic. Great importance is attached to neatness, rapidity and accuracy in the solution of examples. Particular stress is laid upon readiness in dealing with fractions, decimals, percentage and square root. A working knowledge of the Metric System is very desirable.

Algebra.

A thorough acquaintance with the elementary operations of algebra, factoring, involution and evolution, radicals, fractional and negative exponents, simple and quadratic equations, is required. Candidates should possess the power of ready and accurate performance in ordinary algebraic processes, and of putting the language of simple problems into algebraic statement.

Plane Geometry.

Good preparation for entrance requires a year's study of plane geometry as given in the text books in common use.

Physiology.

In this subject Martin's Human Body (briefer course), or equivalent, is required.

Latin.

Cæsar, Gallic War, Books I-III; Vergil, Aeneid, Books I-III; A thorough knowledge of Latin Grammar.

Greek.

Xenophon, Anabasis, Books I-II. A thorough knowledge of Greek Grammar.

Entrance Examinations.

Entrance examinations will be held at Newark on Friday and Saturday, June 17th and 18th, 1898.

On the same dates, examinations will be held at Wilmington, Middletown, Smyrna, Georgetown, Seaford, Milford, Dover and Lewes if any candidates shall notify the Secretary of the Faculty of their intention to appear at such places for examination. All applicants must present themselves on the first day named. The examinations will begin at 9.30 o'clock in the morning of each day.

Entrance examinations will be held at the College on Tuesday and Wednesday, September 13th, and 14th.

Candidates desiring to do so can take part of the entrance examination in June and complete it at Newark, September 13th and 14th.

Entrance to Advanced Standing.

Candidates for entrance to an advanced class in any of the courses are required to sustain an examination upon all studies of the course up to the point at which they seek admission.

Choice of Studies.

Students may, with the approval of their parents or guardians, enter any one of the departments; or they may take such select studies as they are prepared to pursue when circumstances make it advisable not to enter a regular course. Except in the case of mature students who may desire to do special work in any department, it is strongly urged that all applicants for admission prepare themselves for undertaking the work of a regular course.

Changes from one course to another can be made only at the opening of a term, with the approval of the Faculty and the consent of the parent or guardian.

Every student is required to have at least fifteen recitations, or their equivalent, weekly, unless specially excused for cause.

Students in choosing among the elective studies in the Department of the English Language and Literature and Political Science, may with the approval of the Professor in charge, give to a single subject the total number of recitation periods assigned to the elective studies in any given term offered to such students by the Department.

Degrees.

Students who have satisfactorily completed the *Classical*, or the *Latin Scientific* Course, are entitled to receive the degree of *Bachelor of Arts;* those who have, in like manner, completed the Course in *Agriculture and Science*, or the *General Science* Course are entitled to receive the degree of *Bachelor of Science;* those who have completed any of the Courses *in Engineering* will receive the degree of *Bachelor of Civil, Mechanical, or Electrical Engineering* according to the Course pursued. Every Candidate for gradua-

tion in any of the Engineering Courses is required in addition to having pursued successfully the prescribed Course of study, to present to the professor in charge of the department, on or before the first day of May next preceding the Candidate's graduation, a carefully prepared written description, accompanied by any necessary drawings, of some structure, machine or process, which he may have examined.

Every *Bachelor of Arts* who has prosecuted a Course of liberal study for three years after graduation will be entitled to receive the degree *Master of Arts;* and every *Bachelor of Science* who has prosecuted a Course of scientific study for three years after graduation will be entitled to receive the degree of *Master of Science.*

Each graduate of any of the Courses in Engineering will, after three years' practical and successful work in his calling as an Engineer, be entitled to the professional degree, M. E., C. E., or E. E., according to the Course he may have pursued, on the presentation of proper evidence of having performed such work.

In the case of all advanced degrees the candidate is required, as a condition precedent to the conferring of the degree, to write a satisfactory thesis, either literary, philosophical or scientific, and to submit the same to the Faculty at least six weeks before the annual meeting of the Board of Trustees. When a candidate applies for an advanced degree in any of the several Engineering departments, his thesis shall be on a topic related to his profession.

Copies of all theses submitted for degrees must be left with the College as its property.

LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

I. Classical Course.

REMARKS:—In work not requiring outside preparation two and one half periods are counted as one. All work in the Freshman and Sophomore years is prescribed. In the Junior and Senior years elective studies are offered from which the student is required to select sufficient work to give him at least nineteen recitation periods or their equivalent each week. With the approval of the Faculty, the student may select other studies as substitutes for any offered in the elective list.

Freshman Year.

SUBJECTS.	PERIODS PER WEEK. 1st Term.	2d Term.	3d Term.
Rhetoric	2.0	1.0	
History of the English Language	1.0	1.0	
English Composition*	1— 0.4	1— 0.4	1— 0.4
Elocution	1— 0.4	1— 0.4	1— 0.4
American Politics		1.0	2.0
Civil Government			1.0
German or French	2.0	2.0	2.0
Latin	4.0	4.0	4.0
Greek	4.0	4.0	4.0
Algebra and Geometry	5.0	5.0	5.0
Drill	3— 1.2	3— 1.2	3— 1.2
	20.0	20.0	20.0

*Class room work. Theses written outside of recitation hours required at stated periods.

Sophomore Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	2.0	2.0	2.0
English Literature	2.0	2.0	2.0
Composition*	1 = 0.4	1 = 0.4	1 = 0.4
Elocution	1 = 0.4	1 = 0.4	1 = 0.4
German or French	2.0	2.0	2.0
Latin	3.0	3.0	3.0
Greek	4.0	4.0	4.0
Trigonometry and Analytic Geometry†	4.0	4.0	4.0
Drill	3 = 1.2	3 = 1.2	3 = 1.2
	19.0	19.0	19.0

Junior Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	1.0		
Political Economy		2.0	2.0
Composition*	1 = 0.4	1 = 0.4	1 = 0.4
German or French	2.0	2.0	2.0
Latin	3.0	3.0	3.0
Greek	3.0	3.0	3.0
Physics	3.0	3.0	3.0
Inorganic Chemistry	3.0	3.0	3.0
Drill	3 = 1.2	3 = 1.2	3 = 1.2
	16.6	17.6	17.6
Elective Studies.			
Analytic Geometry	3.0		
Calculus		3.0	3.0
Philosophy of History	2.0		
Literature	1.0	1.0	1.0
Public Speaking	1 = 0.4	1 = 0.4	1 = 0.4
Greek Testament	1.0	1.0	1.0

*See foot-note, page 17.

†One period a week throughout the third term is given to Land Surveying.

Senior Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Comparative Politics	2.0		
Psychology		2.0	1.0
Logic			2.0
German or French	2.0	2.0	2.0
Latin	5.0	5.0	5.0
Greek	3.0	3.0	3.0
Sanitary Science	1.0	1.0	1.0
Chemical Laboratory	2— 0.8	2— 0.8	2— 0.8
	13.8	13.8	14.8
Elective Studies.			
Public Speaking	1— 0.4	1— 0.4	1— 0.4
History of Philosophy		2.0	1.0
Natural Theology	2.0		
Moral Science	2.0		
Literature	1.0	1.0	1.0
Spanish or Italian	2.0	2.0	2.0
Greek Testament	1.0	1.0	1.0
Astronomy		2.0	2.0
Calculus	2.0		
Mineralogy	2.0	2.0	2.0
Organic Chemistry	3.0	3.0	3.0
Geology	2.0	2.0	
Biology	4.0	4.0	4.0
Drill	3— 1.2	3— 1.2	3— 1.2

II. Latin Scientific Course.

Remarks:—In work not requiring outside preparation two and one-half periods are counted as one. All work of the Freshman and Sophomore years is prescribed. In the Junior and Senior years students are required to select sufficient work from the elective studies offered, or from other studies, with the approval of the Faculty, to make nineteen recitation periods, or their equivalent, each week.

Freshman Year.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Rhetoric	2.0	1.0	
Composition*	1 — 0.4	1 — 0.4	1 — 0.4
Elocution	1 — 0.4	1 — 0.4	1 — 0.4
History of the English Language	1.0	1.0	
American Politics		1.0	2.0
Civil Government			1.0
German or French	2.0	2.0	2.0
Latin	4.0	4.0	4.0
Algebra and Geometry	5.0	5.0	5.0
Physiology	3.0		
Botany		3.0	3.0
Drill	3 — 1.2	3 — 1.2	3 — 1.2
	19.0	19.0	19.0

Sophomore Year.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
History	2.0	2.0	2.0
Literature*	2.0	2.0	2.0
Composition	1 — 0.4	1 — 0.4	1 — 0.4
Elocution	1 — 0.4	1 — 0.4	1 — 0.4
German or French	2.0	2.0	2.0
Latin	3.0	3.0	3.0
Trigonometry and Analytic Geometry†	4.0	4.0	4.0
Inorganic Chemistry	3.0	3.0	3.0
Botany	2.0		
Zoölogy		2.0	2.0
Drill	3 — 1.2	3 — 1.2	3 — 1.2
	20.0	20.0	20.0

* See foot note, page 17.
† One period a week throughout the third term will be given to Land Surveying.

Junior Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	1.0		
Political Economy		2.0	2.0
Composition*	1 = 0.4	1 = 0.4	1 = 0.4
Organic Chemistry	3.0	3.0	3.0
Chemical Laboratory	2 = 0.8	2 = 0.8	2 = 0.8
Analytical Geometry and Calculus	3.0	3.0	3.0
Physics	3.0	3.0	3.0
Latin	3.0	3.0	3.0
German or French	2.0	2.0	2.0
Drill	3 = 1.2	3 = 1.2	3 = 1.2
	17.4	18.4	18.4
Elective Studies.			
Literature	1.0	1.0	1.0
Public Speaking	1 = 0.4	1 = 0.4	1 = 0.4
Biology	2.0	2.0	2.0
Philosophy of History	2.0		
German or French			

Senior Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Comparative Politics	2.0		
Psychology		2.0	1.0
Logic			2.0
Sanitary Science	1.0	1.0	1.0
Geology	2.0	2.0	
Mineralogy	2.0	2.0	2.0
German or French	2.0	2.0	2.0
Latin	5.0	5.0	5.0
	14.0	14.0	13.0
Elective Studies.			
Literature	1.0	1.0	1.0
History of Philosophy		2.0	1.0
Natural Theology	2.0		
Moral Science	2.0		
Astronomy		2.0	2.0
Calculus	2.0		
Spanish or Italian	2.0	2.0	2.0
Biology	4.0	4.0	4.0
German or French			
Chemical Laboratory	2 = 0.8	2 = 0.8	2 = 0.8
Public Speaking	1 = 0.4	1 = 0.4	1 = 0.4
Drill	3 = 1.2	3 = 1.2	3 = 1.2

* See foot-note, page 17.

III. Agricultural Course.

This course is designed for those who wish to follow any line of agricultural work as a business or to become teachers or investigators in the sciences connected with Agriculture. Its instruction is arranged to give the student a broad intellectual training, especially in Sciences, Modern Languages, English, and Economics. The distinctively technical studies are placed mostly in the last two years, when the student is better prepared to grasp the principles involved. In the Junior and Senior Years a sufficient amount of elective work must be taken to bring the number of recitation periods up to nineteen, at least per week. Two and one-half periods of class room, laboratory, or field work, not requiring outside preparation, are counted as one period.

Freshman Year.

Subjects.	Periods per Week. 1st Term.		2d Term.		3d Term.	
Rhetoric		2.0		1.0		
Civil Government						1.0
Composition*	1	0.4	1	0.4	1	0.4
Elocution	1	0.4	1	0.4	1	0.4
History of English Language		1.0		1.0		
American Politics				1.0		2.0
German		2.0		2.0		2.0
Algebra and Geometry		5.0		5.0		5.0
Physiology		3.0				
Botany				3.0		3.0
Soils		2.0				
Agriculture				2.0		2.0
Shop Work	6	2.4	6	2.4	6	2.4
Military Drill	3	1.2	3	1.2	3	1.2
		19.4		19.4		19.4

* See foot-note, page 17.

Sophomore Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	2.0	2.0	2.0
Literature	2.0	2.0	2.0
Composition*	1 — 0.4	1 — 0.4	1 — 0.4
Elocution	1 — 0.4	1 — 0.4	1 — 0.4
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Trigonometry and Analytic Geometry†	4.0	4.0	4.0
Inorganic Chemistry	3.0	3.0	3.0
Botany	2.0		
Zoölogy		2.0	2.0
Agriculture	1.0	1.0	1.0
Military Drill	3 — 1.2	3 — 1.2	3 — 1.2
	20.0	20.0	20.0

Junior Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	1.0		
Political Economy		2.0	2.0
Composition*	1 — 0.4	1 — 0.4	1 — 0.4
Organic Chemistry	3.0	3.0	3.0
Chemical Laboratory	2 — 0.8	2 — 0.8	2 — 0.8
Physics	3.0	3.0	3.0
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Agriculture	5.0		
Animal Husbandry			4.0
Horticulture and Entomology		4.0	
Military Drill	3 — 1.2	3 — 1.2	3 — 1.2
	18.4	18.4	18.4
Elective Studies.			
Literature	1.0	1.0	1.0
Public Speaking	1 — 0.4	1 — 0.4	1 — 0.4
Biology	2.0	2.0	2.0
Philosophy of History	2.0		
Analytic Geometry and Calculus	3.0	3.0	3.0

*See foot-note, page 17.
†One period a week throughout the third term will be given to Land Surveying.

Senior Year.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Comparative Politics	2.0		
Psychology		2.0	1.0
Logic			2.0
Sanitary Science	1.0	1.0	1.0
Geology	2.0	2.0	
Mineralogy	2.0	2.0	2.0
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Agriculture	4.0		4.0
Veterinary Science		4.0	
Plant Diseases		3.0	
	15.0	18.0	14.0

All elective studies offered in the Senior Year of the Latin Scientific Course (see page 21,) are open to students in this Course.

IV. General Science Course.

This course is arranged for those who desire a training based on Science, History, Modern Languages and English, but do not wish Latin or the special training of the Agricultural or Engineering Courses. During the Junior and Senior years the same elective studies are offered as in the Latin-Scientific Course. In this way opportunity is given for some specialization in study during those years. Students in this course are required, in the Junior and Senior years, to elect a sufficient amount of work to bring their number of recitation periods up to at least nineteen a week. Two and one-half periods of class room work, not requiring outside preparation, are counted as one period.

Freshman Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Rhetoric	2.0	1.0	
Composition*	1 — 0.4	1 — 0.4	1 — 0.4
Elocution	1 — 0.4	1 — 0.4	1 — 0.4
History of English Language	1.0	1.0	
American Politics		1.0	2.0
Civil Government			1.0
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Algebra and Geometry	5.0	5.0	5.0
Physiology	3.0		
Botany		3.0	3.0
Military Drill	3 — 1.2	3 — 1.2	3 — 1.2
Shop-work or Drawing	6 — 2.4	6 — 2.4	6 — 2.4
	19.4	19.4	19.4

Sophomore Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	2.0	2.0	2.0
Literature	2.0	2.0	2.0
Composition*	1 — 0.4	1 — 0.4	1 — 0.4
Elocution	1 — 0.4	1 — 0.4	1 — 0.4
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Trigonometry and Analytic Geometry†	4.0	4.0	4.0
Inorganic Chemistry	3.0	3.0	3.0
Botany	2.0		
Zoölogy		2.0	2.0
Military Drill	3 — 1.2	3 — 1.2	3 — 1.2
	19.0	19.0	19.0

*See foot-note, page 17.
†Land Surveying will be taught one period a week during the third term.

Junior Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	1.0		
Political Economy		2.0	2.0
Composition*	1 = 0.4	1 = 0.4	1 = 0.4
Organic Chemistry	3.0	3.0	3.0
Chemical Laboratory	2 = 0.8	2 = 0.8	2 = 0.8
Analytic Geometry and Calculus	3.0	3.0	3.0
Physics	3.0	3.0	3.0
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Military Drill	3 = 1.2	3 = 1.2	3 = 1.2
	16.4	17.4	17.4
Elective Studies.			
Literature	1.0	1.0	1.0
Public Speaking	1 = 0.4	1 = 1.4	1 = 0.4
Biology	2.0	2.0	2.0
Philosophy of History	2.0		

Senior Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Comparative Politics	2.0		
Psychology		2.0	1.0
Logic			2.0
Sanitary Science	1.0	1.0	1.0
Geology	2.0	2.0	
Mineralogy	2.0	2.0	2.0
German or French	2.0	2.0	2.0
	9.0	9.0	8.0

Elective Studies as in Latin Scientific Course, see page 21.

* See foot-note, page 17.

V. Course in Civil Engineering.

Notes.

In work not requiring outside preparation, two and one-half periods count as one. All work in Freshman, Sophomore and Junior years is prescribed. German is required for three years or French for three. Opportunity is offered for election of a portion of the work in the second and third terms of the Senior Year. Each student must elect, in each of these terms, one of the recommended technical elective studies or a technical equivalent.

Freshman Year.

Subjects.	Periods per Week.					
	1st Term.		2d Term.		3d Term.	
Rhetoric		2.0		1.0		
History of English Language		1.0		1.0		
English Composition*	1	0.4	1	0.4	1	0.4
Elocution	1	0.4	1	0.4	1	0.4
American Politics				1.0		2.0
Civil Government						1.0
German or French		2.0		2.0		2.0
Mathematics		5.0		5.0		5.0
Steam Engines and Steam Boilers		2.0		2.0		2.0
Drawing	6	2.4	6	2.4	6	2.4
Shop-work	6	2.4	6	2.4	6	2.4
Military Science and Tactics	3	1.2	3	1.2	3	1.2
		18.8		18.8		18.8

Sophomore Year.

Subjects.	Periods per Week.					
	1st Term.		2d Term.		3d Term.	
English Composition*	2	0.8	2	0.8	2	0.8
Elocution	1	0.4	1	0.4	1	0.4
German or French		2.0		2.0		2.0
Mathematics		4.0		4.0		4.0
Mechanics		3.0		3.0		3.0
Inorganic Chemistry		3.0		3.0		3.0
Surveying		2.0		2.0		2.0
Descriptive Geometry	2	0.8	2	0.8	2	0.8
Drawing	3	1.2	3	1.2	3	1.2
Field-work	3	1.2			3	1.2
Plotting, etc.			2	0.8		
Military Science and Tactics	3	1.2	3	1.2	3	1.2
		19.6		19.2		19.6

* See foot-note, page 17.

Junior Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
German or French	2.0	2.0	2.0
Mathematics	3.0	3.0	3.0
Mechanics of Solids	3.0	3.0	3.0
Physics	3.0	3.0	3.0
Chemical Laboratory	2 — 0.8	2 — 0.8	2 — 0.8
Mineralogy	2.0	2.0	2.0
Surveying	2.0	2.0	2.0
Drawing	2 — 0.8	4 — 1.6	2 — 0.8
Field-work	4 — 1.6		4 — 1.6
Military Science and Tactics	3 — 1.2	3 — 1.2	3 — 1.2
	19.4	18.6	19.4

Senior Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Calculus	2.0		
Hydromechanics		3.0	3.0
Geology	2.0	2.0	
Sanitary Science	1.0	1.0	1.0
Mechanics of Materials, etc.	3.0	3.0	
Railroad Engineering	3.0		
Highways			2.0
Roofs and Bridges	2.0 / 3 — 1.2	4.0	
Building Construction	2.0		
Masonry Construction			4.0
Contracts and Specifications			3.0
Theme	2 — 0.8	3 — 1.2	
Drawing	2 — 0.8	4 — 1.6	2 — 0.8
Field-work	4 — 1.6		4 — 1.6
Engineering Laboratory		5 — 2.0	
	19.4	17.8	15.4
Elective Studies.			
Railroad Engineering		2.0	
Applied Electricity			4.0
Bridge Engineering		2.0	4.0
Materials of Construction		2.0	4.0
Building Construction		2.0	4.0
Water Supply		2.0	4.0
Sewerage		2.0	4.0
Hydraulics		2.0	
Pumps and Hydraulic Motors			3.0
Spanish	2.0	2.0	2.0

VI and VII. Courses in Mechanical and Electrical Engineering.

Notes.

In work not requiring outside preparation, two and one half periods count as one. All work in Freshman, Sophomore and Junior years is prescribed. Opportunity is offered for election in a portion of the work in the Senior year.

Freshman Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
English	3.8	3.8	3.8
Algebra	5.0	5.0	5.0
Drawing	6—2.4	6—2.4	6—2.4
Steam Engines and Boilers	2.0	2.0	2.0
German or French	2.0	2.0	2.0
Shop-work	6—2.4	6—2.4	6—2.4
Military Science and Tactics	3—1.2	3—1.2	3—1.2
	18.8	18.8	18.8

Sophomore Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
English Composition*	2—0.8	2—0.8	2—0.8
Elocution	1—0.4	1—0.4	1—0.4
Chemistry	3.0	3.0	3.0
Mathematics†	4.0	4.0	4.0
Drawing	3—1.2	3—1.2	3—1.2
Mechanics	3.0	3.0	3.0
German or French	2.0	2.0	2.0
Shop-work	6—2.4	6—2.4	6—2.4
Military Science and Tactics	3—1.2	3—1.2	3—1.2
	18.0	18.0	18.0

*See foot-note, page 17.
†One period a week throughout the third term will be given to Land Surveying.

Junior Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Chemical Laboratory	2= 0.8	2= 0.8	
Mathematics	3.0	3.0	3.0
Physics	3.0	3.0	3.0
Kinematics	3.0	3.0	
Graphical Statics			3.0
Mechanics	3.0	3.0	3.0
Valve Gears	2.0	2.0	
Electricity			3.0
German or French	2.0	2.0	2.0
Drawing	3= 1.2	3= 1.2	3= 1.2
Shop-work	3= 1.2	3= 1.2	3= 1.2
Military Science and Tactics	3= 1.2	3= 1.2	3= 1.2
	20.4	20.4	20.6

Mechanical Engineering.—Senior Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Mathematics	2.0		
Roofs and Bridges	3.0		
Thermodynamics	4.0		
Steam Engine Design	3.0	3.0	
Machine Design	3= 2.0	3= 2.0	3= 2.0
Mechanics of Materials	3.0	3.0	
Steam Boilers		3.0	3.0
Hydromechanics		3.0	3.0
Thesis		3= 1.2	
Pumps and Hydraulic Motor			3.0
Transmission of Power			2.0
Specifications and Contracts			3.0
Shop-work	6= 2.4	6= 2.4	6= 2.4
	19.4	17.6	18.4
Elective Studies.			
Elocution	1= 0.4	1= 0.4	1= 0.4
Railroads	3.0		
Bridges		4.0	4.0
Building Construction	2.0		
Astronomy		2.0	2.0
Water Supply			4.0
Military Science and Tactics	3= 1.2	3= 1.2	3= 1.2

Electrical Engineering.—Senior Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Mathematics	2.0		
Steam Engine Design	3.0		
Thermodynamics	4.0		
Electrical Measurements	1.0	2.0	
Electrical Machinery	4.0	3.0	
Boilers		3.0	
Hydromechanics		3.0	3.0
Thesis		3— 1.2	
Pumps and Hydraulic Motors			3.0
Applied Electricity			5.0
Specifications and Contracts			3.0
Machine Design	3— 2.0	3— 2.0	3— 2.0
Mechanical and Electrical Laboratory	6— 2.4	6— 2.4	6— 2.4
	18.4	16.6	18.4
Elective Studies.			
Roofs and Bridges	3.0		
Mechanics of Materials	3.0	2.0	
Elocution	1— 0.4	1— 0.4	1— 0.4
Railroads	3.0		
Astronomy		2.0	2.0
Boilers			2.0
Transmission of Power			2.0
Bridges		4.0	4.0
Water Supplies			4.0
Military Science and Tactics	3— 1.2	3— 1.2	3— 1.2

Shorter Course in Agriculture.

First Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Rhetoric	2.0	1.0	
Composition*	I = 0.4	I = 0.4	I = 0.4
American Politics		1.0	2.0
Civics			1.0
Inorganic Chemistry	3.0	3.0	3.0
Physiology	3.0		
Zoölogy	3.0		
Botany		2.0	2.0
Entomology		4.0	
Farm Crops and Soils		4.0	
Stock Breeding			4.0
Breeds of Live Stock			3.0
Farm Economy, Farm Appliances and Machinery	4.0		
Algebra and Geometry	5.0	5.0	5.0

Second Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
English Literature	2.0	2.0	2.0
Composition*	I = 0.4	I = 0.4	I = 0.4
Organic Chemistry	3.0	3.0	3.0
Sanitary Science	1.0	1.0	1.0
Botany	4.0		
Manures and Fertilizers and their Use	4.0		
Stock Feeding and Dairying	2.0		
Plant Diseases		2.0	2.0
Horticulture		4.0	
Veterinary Science		3.0	3.0
The Composition and Structure of Plants			3.0

Note.—Shop-work throughout at least one year.

* See foot-note, page 17.

CORNER OF CHEMICAL LABORATORY.

LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

METHODS OF INSTRUCTION.

English Language and Literature.

The studies in this department include Rhetoric, Composition, the History of the English Tongue, and Literature.

The study of Rhetoric and of the history of the English Tongue are begun in the first term of the Freshman Year, and the former is continued throughout the year, while the latter occupies but two terms. Along with the study of Rhetoric there is special class instruction in the art of Composition, and throughout the entire course written themes are frequently required of all students.

American Literature is taken up in the first term of the Sophomore year, and English Literature somewhat later in the same term.

Literature is a required study to the end of the Sophomore Year only, and is optional thereafter throughout the remainder of the course. The object aimed at during the required course in American and English Literature is to cultivate a taste for the best reading rather than to cumber the memory with names, dates and mere biographical details concerning the masters of literature.

A considerable amount of reading is required during this part of the course, and the lectures are made short in order that there shall be time for reading and discussion in class.

The optional course in literature is devoted to the study of the great masters and of the history and philosophy of literature.

A library chosen especially with a view to the needs of students in literature is an important adjunct to the study, or perhaps it would be more nearly true to say that the class room is made an adjunct and introduction to the library.

Mental, Moral and Political Science.

The more abstruse studies in these departments are placed late in the course, and some of them are made elective for part or for all of the students.

The effort has been made to provide a consistent and well-developed course in Political Science, including History, Civil Government, Political Economy, and Comparative Politics.

The study of American Politics is introduced in the second term of the Freshman Year, and here the intent is that as far as possible the lectures shall be subordinated to special investigations to be made by the students themselves.

The library is the workshop of students in this branch, and many books bearing especially upon this subject have recently been provided.

Following upon the subject of American Politics comes the study of Civil Government in the United States, and the general subject is continued throughout the Sophomore Year in historical studies.

These in turn lead to Political economy and Comparative Politics.

Course in Elocution and Public Speaking.

The object of this course is effective public speaking. Three contributory objects are aimed at in the work,—a better command of language, original thinking and mental discipline.

Freshmen are especially instructed in the art of reading aloud. The effort here is not so much to train the student in dramatic expression, as to insist that he thoroughly master the meaning of what he reads, and thus to make sure that his reading shall be easily intelligible to the hearer. It is hoped that the training at this point in the course will develop a keenly appreciative taste in literature, and the intent here and throughout the course is to make the study of Elocution an important aid to the study of the English Language and Literature. It is to this end that selections for reading and declamation are, when it is possible, chosen from the works of the authors at the same time under consideration by the class in English Literature. Considerable time is given in the Freshman Year to the subject of pronunciation, voice development, and the principles of modulation.

The work in the Sophomore Year is chiefly devoted to the preparation and delivery of declamations. These are not mere imitative exercises. The delivery of each declamation is followed by stimulative criticism. Declamations must be selected from the works of the best British and American writers, or from the speeches of public men. The College library affords abundant material for selection. Some of the exercises required of the Freshmen are continued throughout the Sophomore Year.

Such members of the Junior and Senior classes as elect to continue the study of declamation, are trained in public speaking. Speech-making is begun in its simplest form,—conversation, followed by narrative description, extempore speaking, and, finally, argument and debate. The whole naturally leads up to the commencement orations.

There are special meetings when all classes come together for declamations, speeches and lectures, and there are annual public contests in declamation with an award of prizes.

Class instruction includes parliamentary law, the principles of argumentation, the interpretation of selections, and the principles of oratory.

Modern Languages and Literatures.

French and German are among the required subjects of study, and Spanish and Italian are offered to such as wish to elect them. Each student must study the modern languages at least three years. One language (German or French) may be taken three years; or one language two years, and the other language one year. In some courses, as much as ten years of modern languages may be taken.

The work is so conducted as to give all an opportunity to learn to read the modern languages readily; to understand them when heard; to write them correctly, and so to be able to learn easily to speak them, if necessity arises; but the main object is to inspire such a love for the literatures and languages, as will be a source of pleasure and of intellectual growth. Lectures are occasionally given in English, French or German. Books are being collected, and advanced methods of work are being adopted, as fast as the time at command and the resources of the library will permit. Work has been done this year in Old French (Aucassin and Nicolette), in the French Classics and the Romantic School, as well as in the Modern French writings; also in Middle High German (Nibelungenlied), in the German Classics (including both parts of Faust) and in Modern German writings. The Course in Italian, including readings from Dante's Divina Commedia, has been given.

The publications of the Société des Anciens Textes Français, Godefroy's Old French Dictionary, Romania, Zeitschrift für Romanische Philologie, Beiträge zur Geschichte der Deutschen

Sprache und Literatur, Goethe-Jabrbuch, The Journal of Germanic Philology, Modern Language Notes and other helps are now in the library. Some elementary work in Old High German will probably be offered in 1898-99. The work in Old German and Old French especially will be made to throw light on the English language and literature, as indeed all the work in the modern languages is intended to do.

The following courses will be offered in 1898-'99.

FRENCH.

1. Beginning French. Grammar (Whitney). Easy reading in modern French. Twice a week.
2. The Romantic School. Crane's Romantisme Français. Hugo's Hernani. Grammar continued. Twice a week.
3. The French Classics. Molière, Corneille, Racine. Course conducted largely in French. Writing French. Twice a week.
4. History of French Literature, with readings in Montaigne, Rabelais, etc. Course conducted chiefly in French. Old French (Aucassin and Nicolette). Twice a week.

SPANISH.

5*. Grammar (Manning.) Easy Reading in modern Spanish. Twice a week.

ITALIAN.

6*. Grammar (Manning.) Easy reading in modern Italian. Twice a week.

GERMAN.

1. Beginning German. Grammar (Joynes-Meissner.) Easy reading in modern German. Twice a week.
2. Schiller's Jungfrau von Orleans. Lessing's Minna von Barnhelm. Goethe's Hermann und Dorothea. Grammar continued. Twice a week.
3. Goethe's Faust (Parts I. and II.) Course conducted largely in German. Writing German. Twice a week.
4. History of the German Literature. Course conducted chiefly in German. Selections from Middle High German writers. Twice a week.

*Only one of these courses (probably Spanish) will be given in 1898-'99.

Latin and Greek.

COURSE OF STUDY AND METHODS OF INSTRUCTION.

FRESHMAN YEAR.

LATIN.—Nepos, De Viris Inlustribus. Vergil, Books IV-VI. Four hours a week throughout the year.

GREEK.—Xenophon, Anabasis Books III-IV. Homer, Iliad Books I-III. Four hours a week throughout the year.

SOPHOMORE YEAR.

LATIN.—Cicero, 5 Orations. Ovid, Metamorphoses, 2500 verses. Prose composition. Three hours a week throughout the year.

GREEK.—Xenophon, Memorabilia. Homer, Odyssey. Herodotus, Book VIII. Four hours a week throughout the year.

JUNIOR YEAR.

LATIN.—Livy, 21st or 22d book. Horace, Odes, Satires, Epistles. Prose composition. Three hours a week throughout the year.

GREEK.—Plato, Phaedo. Thucydides, Book I. Demosthenes, 3d Olynthiac. Three hours a week throughout the year.

ELECTIVE.—Greek Testament, one hour a week throughout the year.

SENIOR YEAR.

LATIN.—Tacitus, Germania and Agricola. Juvenal, Satires. Plautus, or Terence, Comedies. Collateral reading. Five hours a week.

GREEK.—Aeschylus, Prometheus Bound. Arrian, Anabasis of Alexander. Lucian, Timon. Collateral reading. Three hours a week throughout the year.

ELECTIVE.—Greek Testament, one hour a week throughout the year.

LATIN LANGUAGE AND LITERATURE.

Much of the training in the Freshman year is devoted to acquiring an extended vocabulary, familiarity with the Latin order of thought and syntax. Throughout the course the aim is to enable the student to acquire facility and quickness in reading at sight. Word-meaning is fixed by inspecting form, derivation, and comparing with synonymes. While the work of the first three years is limited at present to the study of authors of the Ciceroni-

Augustan age, the work of the Senior year may be changed from time to time to embrace not only the leading authors of the Silver age but also the chief representatives of Early and Late Latin, thus giving the student a comprehensive scope of Latin literature. The public and private life of the Romans and their influence on modern literature and civilization are continually kept before the minds of the students. The topography of Rome with its remains, ancient life in its various aspects, and the other departments of archaeology will be discussed, illustrated by magic lantern slides.

GREEK LANGUAGE AND LITERATURE.

The authors in Greek are selected with a view to their representative character. The aim is to give the student some familiarity with the Greek epic, tragedy and comedy; with the historians, philosophers and orators. The student's attention is called to the differences in style of the authors and to dialectic peculiarities. Greek life and archæology will also be discussed and illustrated by magic lantern slides. Collateral reading in Latin and Greek is required in the Senior year. New Testament Greek is offered as an elective in Junior and Senior year. In both departments the general principles of comparative philology are explained and applied and an effort is made to create in the student an impulse to pursue more thoroughly these subjects in a university and to prepare him to enter upon such courses with success and pleasure.

Mathematics.

All the prescribed mathematical work of the College is required of students in the several Engineering Courses. In the Latin Scientific and General Science Courses it is required to the end of the Junior Year. In the Classical and Agricultural Courses the required work in mathematics ends with the Sophomore Year. The course in mathematics up to the end of the Sophomore Year is the same for all students.

In the Freshmen Year a short general review of elementary algebra and plane geometry is given, but the main part of the time is occupied with the completion of algebra beyond what is required for admission and with solid geometry and the mensuration of solids. Throughout the year original exercises in demonstration and solution are required.

In the Sophomore year plane and spherical trigonometry are finished early in the second term, and during the rest of the year the conic sections are studied by purely geometrical, as well as by analytical methods.

Early in the Junior Year the course in analytic geometry is completed, and the remainder of the year is given to the study of the differential and integral calculus.

Throughout the first term of the Senior Year an advanced course in the application of the calculus is pursued. In the second and third terms of the Senior Year instruction is given in Astronomy, Young's General Astronomy being the text-book used.

Students who may desire to pursue advanced mathematical studies will have opportunities of receiving instruction in the Method of Least Squares, Differential Equations, Determinants, Quaternions, Theory of Functions, etc. Instruction in these subjects will be given by means of lectures, recitations and reading of standard authors in the class room.

Physics.

The character and amount of instruction offered in special departments of Physical Science and continuing throughout the Sophomore, Junior and Senior Years are fully set forth under the proper headings in the description of the Engineering Courses.

Instruction is given by means of recitations, lectures, experimental demonstrations and laboratory exercises.

The course in General Physics required of all students in any of the regular courses extends through the Junior Year. The first term is given to the study of the laws and properties of matter, sound and heat. After the subject of heat has been finished, magnetism and electricity are studied in the second term. In the third term electricity and light are the subjects of study. The physical department is well equipped with apparatus for class room illustration and for laboratory work. The library of the department contains a valuable collection of standard books of reference and the leading journals, American and foreign are at all times accessible to the students.

Chemistry, Mineralogy, Geology and Sanitary Science.

Instruction is given in Pure and Applied Chemistry by lectures, recitations, and laboratory practice. This course extends through the Sophomore, the Junior, and the Senior year, and embraces the elements of Inorganic and Organic Chemistry. Students, after making themselves familiar with the details of experiments, are required to repeat the same in the laboratory.

The chemical laboratory is open daily for instruction in analytical chemistry.

The course in quantitative analysis includes the examination of simple and complex substances in the wet way, their analysis by the use of the blow-pipe and flame reactions, and the determination of minerals with the blow-pipe.

Students are required to keep a careful record of their work, and submit the same to the inspection of the Professor. Upon passing satisfactory examination in qualitative analysis, students may, if they so desire, take up quantitative analysis.

The course of instruction in quantitative analysis includes the examination of simple and complex salts, minerals, ores, ashes of plants, fertilizers, water, etc., by gravimetric and the volumetric methods.

In order to make the instruction as *practical* as possible, lectures upon the leading *Chemical Industries* will be given throughout the entire course.

Assaying.—The assay laboratory is kept in full working order, completely furnished with crucible, scorification and cupelling furnaces, and everything for practical work in the assay of ores of lead, silver, gold, etc. The general principles as well as special methods of assaying are explained in the lecture room, and at the same time ores of the various metals are exhibited and described. From a collection of these ores from various parts of the country, the students are required to make a number of assays under the immediate supervision of the Professor.

Mineralogy.—The course of instruction in Mineralogy extends throughout the Junior year. The first term is usually occupied with the discussion of the *Physical Properties* of minerals, including their morphological properties (Crystallography), their optical properties, hardness, specific gravity, etc. The second and

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the third terms are devoted to Descriptive Mineralogy. Students also receive practical instruction in Determinative Mineralogy.

Geology.—The work in this department comprises recitations and lectures upon General Geology throughout two terms of the Senior year. The student is first taught the principles of Lithology and of Microscopic Petrography. For this work the College has provided itself with the best petrographical microscopes and sets of hand specimens and thin sections of the typical rocks. The study of Structural and Dynamical Geology occupies the second term of the Senior year, when the student is taught the arrangement of rock masses, and the agencies concerned in their upheaval, erosion and metamorphism.

Sanitary Science.—The instruction in this important study is thoroughly practical, and embraces recitations and lectures on the following subjects: Water, Air, and Food; Disposal and Utilization of Sewage; Origin and Spread of Epidemics; Disinfectants and their Uses; Ventilation and Warming; Vital Statistics, etc.

Biology.

The aim of biological instruction is to give the student some knowledge of the various living things by which he is surrounded and the relation which man bears to them economically, biologically and morally, as well as to develop habits of careful observation and comparison, and close and accurate methods of thinking.

Most of the time is spent in actual study in the laboratory, which is supplied with tables, microscopes and re-agents, as well as with illustrative specimens and charts.

Material for dissection is supplied by the college, although the students are encouraged to collect as much as possible. The required work in biology is finished with the Sophomore year, but to provide for the continuation of the work by those who desire to pursue its study further, elective work is offered in the Junior and Senior years.

Those students who expect to become farmers, physicians or naturalists, or who have a decided liking for Natural History studies, will thus have opportunity to continue their work in a line directly in accord with their tastes and future occupation in life and, at the same time, obtain the mental drill which is the chief object of a college training.

Elective work in either Botany or Zoölogy may be arranged to suit the taste, capacity and fitness of the student desiring it, and will consist mostly of laboratory work in Phænogamic Botany and Vertebrate Zoölogy.

Human Anatomy and Physiology.—Martin's "The Human Body, Briefer Course," is used as a text-book for this study during the first term of the Freshman year.

It is expected that, in this way, a student will become acquainted with the more important facts connected with the structure of the body, the form and uses of the various organs and the Hygiene of the body.

Illustrative material, consisting of fresh or preserved specimens, skeletons and charts, is used whenever practicable.

Botany. Beginning with the second term of the Freshman year, the study of Botany is continued one year. In the first term most of the time is spent on the gross and microscopic structure of the higher plants. During the second term, when abundance of fresh material can be had, the structure and relationships of flowering plants are studied by means of specimens, of which written descriptions are required.

Some work with an analytical key is required, so that a student may be familiar with its use and gain a clear conception of the relations of plants to each other and their classification into species, genera and larger groups.

In the third term the study of flowering plants is finished and several typical specimens of cryptogams studied so that the students may know something of the life histories of these lower forms of plants.

A set of about 130 wall charts, a large number of mounted microscopic specimens and a herbarium, provide plenty of material for illustrating the various subjects as they come up for study.

A library of the more important reference works is kept in the laboratory and students are encouraged to use it.

The larger part of the time given to the study of Botany is spent in the laboratory, but this work is supplemented by the use of a text-book and some recitations or lectures.

Zoölogy. During the last two terms of the Sophomore year Zoölogy takes the place of Botany. As in the latter study, most of the time is devoted to laboratory work.

Selected types of the various classes of animals are dissected, and in this way the student becomes acquainted with animal

structure by studying animals themselves, and the development of the faculties of observation and comparison is continued.

Invertebrate types are considered during the first term, and vertebrate forms in the second term.

Written records of work accomplished, illustrated by drawings are required of each student.

The laboratory is supplied with a collection of charts illustrating the invertebrates, and a set of mounted skeletons showing the variations in vertebrate forms. There is also a supply of disarticulated skeletons for use in class and compound microscopes in sufficient number so that each student has the use of one.

A collection of marine invertebrates obtained from the U. S. National Museum and other specimens of various kinds assist in giving some idea of the great variety of animal forms.

Agriculture.

Three courses in Agriculture are offered, viz., a Four Years Course leading to a degree, a Two Years Course, and a Winter Course coincident with the regular winter term of the College.

The Four Years Course, upon the completion of which the student receives the degree of B. S., is parallel with the other courses of the College.

The object of the course is to give young men a collegiate training by the use of those studies which are likely to be most beneficial to one engaged in any pursuit connected with Agriculture.

The training in this course is in every respect equal to that in any other course in the College, and the opportunities in life, for graduates from it, are of the very best. Reference to the outline of the course on page 22 will show that it has for its foundation those scientific studies upon which all sound agricultural knowledge is based, supplemented by certain special agricultural studies designed to connect the sciences with agricultural practice.

The course is intended to fit young men for farm superintendents or to fill any position where a knowledge of scientific agriculture is needed.

The Two Years Course is for those who feel that they cannot give the time necessary for a four years course, and yet wish the foundation of a good English education, with some knowledge of the principles of Agriculture.

The Winter Course has been organized for the benefit of those who wish to make use of the comparatively leisure time of the winter season on the farm, by getting some systematic instruction upon topics directly related to farm life.

It is open to men or boys above sixteen years of age and no examination for entrance is required.

Since this course was arranged five years ago a number of young men have availed themselves of its opportunities and it is expected that as it becomes more widely known the numbers taking it will increase.

The instruction is largely given by means of lectures, but laboratory work and text-books are used to some extent.

The subjects considered are as follows:

Agricultural Chemistry,
Breeds of Live Stock,
Stock Breeding,
Stock Feeding,
Soils,
Manures and Fertilizers,
Dairying,
Veterinary Science,
Plant Diseases,
Agricultural Bacteriology,
Economic Entomology,
Horticulture,
Botany,
Drainage,
Shop Work,
Civics.

A circular fully describing this course will be sent upon application.

Horticulture.

The instruction in horticulture is given during the winter term in a course comprising three lectures per week. The series of lectures is intended to give the latest information and methods connected with the underlying principles of commercial fruit culture. Among the subjects receiving special attention are:—orchard cultivation; pruning; the propagation of fruits; the spraying of orchards and small fruit plantations; the packing and marketing of fruits; cold storage; orchard machinery; the origin, improvement and selection of varieties. Opportunity for laboratory and as much field work as possible is given the students.

Entomology, Economic.

The course in entomology consists of one lecture per week during the winter term. The aim of the lectures is to consider insect life in its relation to horticulture and agriculture. The following features are prominently emphasized in the course: the increase of insect pests; our insect friends; their relationships; their external and internal anatomy, their life history; the applications of the preceding features to the prevention and destruction of insects; insecticides. A detailed account is given of the principal insects that attack fruit and farm crops, and specimens from the collection are placed before the students.

Civil Engineering.

The object of the course of instruction in civil engineering is twofold; first, to fit those pursuing it previous to professional life to be, at graduation, immediately useful as assistants to engineers in charge of structures and works; second, to meet the needs of those who, having engaged, without a preliminary scientific training, in the work of the engineer, find themselves at a disadvantage. It is believed that these ends can be attained most readily by such training as will impart accurate knowledge of natural laws and of the properties of materials, and develop power to apply that knowledge intelligently in professional practice. Therefore, the technical studies are preceded by liberal and thorough instruction in the mathematical and physical sciences.

Entrance Requirements are fully stated on pages 12-14. In addition, knowledge of language and natural science as taught in our high schools will contribute much to the satisfactory progress of the student. In order that those pursuing this course may derive therefrom the greatest benefit, it is recommended that their mathematical preparation, in particular, be thorough.

Degrees.—Each student who complies with all the rules of the College and satisfactorily completes this course is eligible to the degree, Bachelor of Civil Engineering, (B. C. E.). As a portion of his work in course he must prepare a written description, also such drawings as are necessary for its proper elucidation, of some structure, machine or process which he may have examined, designed or devised. The description must be written upon regulation paper. It and the necessary drawings, all of which will be

retained by the College as its property, must be presented to the Professor in charge of the Department on or before the first day of May next preceding the time for the student's graduation. While throughout the preparation of this description students have the advice and aid of the Professor, in the first and second terms of the Senior year time is allowed in the course of instruction for working upon it under his immediate direction.

Each graduate who has been engaged for three years subsequent to his graduation in practical and successful work as an engineer, and who has prepared and presented to the Faculty at least six weeks before the June meeting of the Board of Trustees a satisfactory thesis on a topic related to his profession, is eligible to the professional degree, Civil Engineer, (C. E.). The thesis, with accompanying drawings, is retained by the College as its property.

Nature of Course.—Granting that the applicant is competent to select such a course of study as will lead to a desired end, the method of gaining such ends must depend upon such knowledge and experience as the applicant does not possess. The College allows, therefore, large opportunity for the satisfaction of individual choice by offering different well defined courses of study; but, particularly in the technical courses, prescribes the greater portion of the work.

On pages 27-28 is an outline of the subjects included in the course in civil engineering and of the amount of time allotted to each. As an aid to those contemplating the pursuit of the course, it is proposed here to set forth more definitely its nature and content, by describing in detail the scope and purpose of the different subjects therein. It is believed that all the preliminary studies will either directly or indirectly contribute to professional success.

Language.—The language group includes English, German and French. The business relations of the practicing engineer make it necessary that he be able to express himself properly in both spoken and written language. To this end, especially in the course in English, special attention is paid to composition under the eye of the teacher, and excellent facilities are afforded for gaining a knowledge of proper methods in public speaking and of parliamentary practice. The courses in German and French are especially designed to render accessible to the student the scientific and technical matter contained in books and periodicals in those language.

Mathematics.—The mathematical course is full and

thorough. Particular attention is called to the fact that it includes a very full course in mechanics both theoretical and applied;—in the Sophomore year an elementary general course;—in the Junior and Senior years an advanced course in mechanics of solids and hydromechanics, the latter including hydrostatics, flow through orifices, through tubes, in pipes and in conduits;—in the Senior year a course in mechanics of materials and of beams and columns. An engineering laboratory course in the properties and strength of materials illustrates and supplements the text-book and lectures.

Physics, Chemistry, Mineralogy, Geology.—In these subjects there are full courses, including appropriate laboratory and field-work, as elsewhere explained under the several heads. The course in chemistry includes lectures on the leading chemical industries, and full treatment of the metallurgy of iron and steel and the production of their commercial and structural forms.

Sanitary Science.—The instruction in this branch includes lectures and recitations on water, air, food, disinfectants, ventilation, heating and the disposal of sewage.

Steam Engines and Steam Boilers.—The course in these subjects is intended to familiarize the student with the names and uses of the parts of engines, boilers and pumps. In the management and running of engines and boilers practical instruction is given.

Surveying.—Text-book work and lectures in the Sophomore and Junior years include descriptions of the instruments used and the methods employed in land surveying, triangulation, topographical surveying and leveling, mining surveying, hydrographic surveying and city surveying. In the Junior year is included as much of mathematical astronomy as bears upon the work of the surveyor, an explanation of the methods employed in geodetic work and of the adjustment of observations by the method of least squares. Instruction in the class-room is supplemented by field-work, including, in the Sophomore year, land surveying with chain, tape, compass and transit, and elementary operations in leveling; in the Junior year topography with transit, level, stadia and plane table, precise measurement of lines and angles, and determination of latitude, azimuth and time; and in the Senior year railroad surveying.

Railroad Engineering.—This course, as prescribed, treats of the location and construction of railroads, illustrating in the class-room, the field and the drafting-room the operations and

methods involved. Complementary to this course is that on HIGHWAYS, including roads, streets and pavements, their location, construction and maintenance. The sources and manufacture of paving materials are described, the engineering laboratory aiding in the study of their properties.

ROOFS AND BRIDGES.—In lectures in the first and second terms of the Senior year the common forms of trusses are briefly described and their construction explained. The methods of determining the stresses in framed structures by both algebraic and graphic processes are fully set forth; the student, by solving many and varied illustrative problems, making constant application of the knowledge acquired.

BUILDING CONSTRUCTION.—In this course it is proposed to treat particularly of wood and its use in construction, special reference being made to the framing of floors, partitions and roof trusses. Also attention will be given to roofing, sheet metal work, paints and painting, with descriptions of the characteristics and properties of the materials used.

MASONRY CONSTRUCTION.—This includes a treatment of masonry in general. The greater part of the time devoted to the subject will be given to railroad and bridge masonry and to the different kinds of foundation work for heavy structures.

CONTRACTS AND SPECIFICATIONS.—This course includes a presentation of the law of contracts, a treatment of the general features of engineering specifications with descriptions of the related documents and their uses, and of the common forms of business paper.

DRAWING.—The course in drawing is thorough and complete. It includes lettering such as is used on working drawings, use of drawing instruments, geometrical constructions, instrumental copying of machine details, descriptive geometry with special attention to the method of making working drawings, perspective and isometric drawing, free-hand sketching of structural details and of machine parts, working drawings from the sketches, tracings and blue-prints from the drawings, tinting and shading, designing of static structures, topographic symbols, and plotting from field-notes.

SHOP-WORK.—This course is designed to train the eye and the hand, and to afford a knowledge of common tools and the modes of using them. It includes

(a) Bench-work in wood.—This includes descriptions of tools, and work with saw, plane, auger, bit, chisel and kindred tools in making joints, such as timber splices, mortises, tenons and mitres, and light cabinet work and models of roof and bridge trusses.

(b) Wood-turning.—This includes use of lathe tools in straight and compound turning in soft and hard woods, involving caliper work, hollow turning, turning to template, screw-plate and chuck work.

(c) Bench-work in iron.—This includes work on cast and wrought iron and brass,—chipping, use of file and scraper in producing flat and curved surfaces, fitting, slotting, dovetail work, screw-cutting with taps and dies, pipe-fitting.

Students who, previous to entrance, have satisfactorily completed such a course as that described, will have more advanced courses of shop-work assigned them.

The subjects described, with the three year's course in Military Science and Tactics, constitute the prescribed portion of the course. Circumstances may make it desirable that students should have opportunity to prepare for special lines of work. To afford this, the electives in the second and third terms of the Senior year are offered. Each student must elect, in each term, one of the technical studies or a technical equivalent. The subjects selected should be properly related as are those with the same title in the two terms, those in railroad engineering and applied electricity, and those in hydraulics and pumps and hydraulic motors. As an aid to the student the following data concerning the electives are given:—

Railroad Engineering is extended to include maintenance of way, equipment, and a study of economic problems which arise in the location and operation of railroads.

Applied Electricity.—This course includes a study of the arrangement of plants for generating electricity for lighting and power, the erection of distributing lines, interior wiring, arc and incandescent lamps, motors and electric railways. The lectures are supplemented by visits to lighting and power plants.

It includes also the application of electricity in connection with the telegraph and the telephone, and in domestic uses with bells, annunciators, gas-lighting and fire and burglar alarms.

Bridge Engineering.—This is a continuation of the course as prescribed, and includes the presentation and application of methods in actual use in the calculations for roof and bridge work,

also a study of the principles involved and a description of the methods employed in the designing, constructing and erecting of framed structures. The lectures and text-book work are supplemented by visits to bridge works and to structures in course of erection.

Materials of Construction.—A course devoted to the study of the sources, manufacture and physical properties of materials used in construction. It includes a large amount of laboratory work and is designed to fit a student to be a useful assistant in a testing laboratory.

Building Construction.—This is a continuation and extension of the subject as previously presented, special attention being given to its engineering features, including those characteristic of mill-work and tall building construction. It is adapted to the needs of those who contemplate architecture or building as a vocation.

Water Supply, Sewerage.—The different systems in use are described and the conditions to which they are respectively adapted. The principles involved in their design are discussed and the engineering features involved in their construction are explained.

Hydraulics.—This is a course in measurement of water by orifices, flow over weirs, flow in rivers and measurement of water power.

Pumps and Hydraulic Motors.—This includes the study of both reciprocating and rotary pumps and of turbines, much of the time being devoted to the last. The course is closely allied to that on water supply.

Spanish will suggest itself as a study desirable for those contemplating a professional career in Central or South America.

Texts.—In mechanics of solids, Wright; in hydraulics, Merriman; in mechanics of materials, Merriman; in sanitary science, Wilson; in steam engines, Holmes; in surveying, Davies, Raymond; in railroad engineering, Nagle, Godwin, Tratman; in roofs and bridges, Merriman, Johnson; in building construction, Kidder; in masonry construction, Baker; in contracts and specifications, Johnson; in applied electricity, Lessons of the National School; in materials of construction, Johnson; in water supply, Fannig, Burton; in sewerage, Staley and Pierson, Baumeister; in pumps and hydraulic motors, Blaine.

Methods of Instruction.—Instruction is by text-book and lectures, by laboratory, drafting-room, field-work and shop-work, by the use of current professional journals, and by visits, followed by carefully prepared reports, to structures in process of erection, good types of finished structures, and industrial establishments.

The chief objects in all laboratory, field and shop-work are to secure mental discipline and to supplement the work of the lecture room by illustrating principles and impressing facts therein set forth. Without subordinating the true educational function of these branches, the work is so carried on as to give the student an intelligent preparation for similar work after graduation.

The visits of inspection and reports thereon are considered important aids in developing correct methods of observation and description and in forming acquaintance with engineering works.

Facilities for Instruction.—The Department is well supplied with the necessary instruments for laboratory and field-work. The shops are well equipped. All equipment is of the best quality and is being rapidly increased. The Department has a working library, kept up to date, containing standard works in all branches of civil engineering. It is supplied also with the leading professional periodicals named in the general library list on another page. In that list are named also scientific periodicals both American and foreign. To all the periodicals, and to the books in both departmental and general libraries, the students have constant access. They are offered every facility in the prosecution of their work.

The course is well organized throughout and in complete and successful operation. Many of the graduates are filling desirable positions as assistants in the different branches of professional work.

Department of Electrical and Mechanical Engineering.

Description of Studies and Methods of Instruction.

Two courses are offered in this Department.

Mechanical Engineering, a four years course leading to the degree of Bachelor of Mechanical Engineering.

Electrical Engineering, a four years course leading to to the degree of Bachelor of Electrical Engineering.

Each graduate of either of these courses will, after three years practical and successful work in his calling, be entitled to the professional degree of M. E. or E. E. according to the course he may have pursued.

Favorable opportunities for instruction are offered in these important departments of scientific and technical training. The rapid increase of our manufactures, requiring the economical utilization of all sources of power, and the design, and construction of much special machinery, open a broad field for the Mechanical Engineer, while Electrical Engineering, with its growing importance, the constantly increasing number of its applications and many possibilities, is a very attractive profession.

The courses in this Department are designed to teach the principles underlying Mechanical and Electrical Engineering, and to prepare young men to design, construct and supervise machinery and electrical apparatus, and meet successfully the problems which may arise in the practice of their profession.

In addition to the strictly technical studies, students receive instruction in the English language, Chemistry (including laboratory course, and metallurgy of iron and steel), Mathematics, Physics, German or French, together with a thorough course in Mechanics, comprising Mechanics of Solids, Mechanics of Materials, Hydromechanics, and Roofs and Bridges.

The Courses of Mechanical and Electrical Engineering are very closely allied, electric energy being now most economically developed by mechanical devices which require a motive power furnished by some prime mover, so that the installation of an electric plant requires a large amount of mechanical knowledge.

The courses, therefore, are nearly identical for the first three years. In the Senior year they differentiate, each class pursuing separately those subjects pertaining to their particular branch, while some studies remain common.

The aim is to train men to unite correct theory with practical requirements. To accomplish this fully, much stress is laid on proficiency in the actual management and care of apparatus, much time being devoted to practical work.

For this purpose the Department is furnished with a well equipped Wood-working, Machine, and Black-smith Shop, and Electrical laboratory containing Motors, Dynamo, Storage Battery, and various testing instruments sufficient for a full course, new

apparatus being added as necessary. Instruction is given under the following heads.

Drawing and Machine Design.—This course extends through the whole four years, beginning with Lettering and Instrumental Drawing in the Freshman year, and includes instruction in Plain, Script and Ornamental Lettering. A course in Geometrical Construction, with such parts of Descriptive Geometry as bear directly on Mechanical Drawing, problems involving orthographic and isometric projection, and the intersection and development of surfaces are worked out on the drawing board. Such exercises are given, as will best render the student familiar with the use of the drawing instruments.

Copying of Machine detail follows. Attention is paid to the conventional methods of representing metals, the proper dimensions of parts, and the need of different views, sections, etc., for clearness.

Tracings and blue prints are made for shop use. Free-hand sketches of machines in the shops are taken, and from some of these complete detail drawings are made in the drafting room.

The use of water colors, tinting and shading with the conventional colors for wood, metal, etc., in machine construction are also taught.

In the Senior year machine design and the drawing of special machines are taken up.

Kinematics.—This includes a study of the transmission of motion by machine parts, such as clutches, belts, cams, screws, gearwheels, links, etc. The teeth of wheels are constructed and velocity diagrams for the various motions are laid down, many problems being worked out on the drawing board.

Graphical Statics of Mechanism.—The graphical methods of obtaining the equilibrium and efficiency of mechanisms are taught. The harmful resistances caused by friction are considered and numerous problems are worked out on the drawing board.

Machine Design.—Some time is given to the *Materials of Engineering* after which the proper proportioning of screwed and keyed fastenings and the simpler transmission machinery is taken up. This is followed by the design of shop-tools or some special machine. Each class will, if possible, work out one or more designs and furnish working drawings and sketches of the details.

Steam Engine Design.—Each student is required to design the principal parts of a steam engine, calculating for strength,

appearance, and cost of manufacture. Some of the details are fully worked out and working drawings for them are made. Lectures are given on the theory of compound and triple expansion engines and condensers.

Steam Boiler Design.—This includes value of fuels, efficiency of heating surfaces of types of boilers, size of parts, allowing for strength and corrosion, arrangement of flues and chimneys, of steam and feed pipes, and methods of setting. Students are required to calculate the parts of a steam boiler and to furnish drawings for a boiler and setting, from their own designs.

Electric Machinery Design.—After the theoretical and practical courses in Dynamo-Electric Machinery are completed, the knowledge gained is applied to the design of some piece of electrical machinery, each student being required to design parts of a dynamo, motor or transformer.

The Courses in Designing Machinery are intimately associated with the shop and laboratory courses and the work is carried on as nearly as possible like that of the Engineering Drawing Office. The Department is in possession of many working drawings of machine-tools, engines, boilers, etc., which have been generously given by many of the leading manufacturing firms. Constant reference is made to them, and to trade catalogues, a full set of which is kept in the Department.

PRIME MOVERS.

Steam Engines and Boilers.—This course, given in the Freshman year, is intended to familiarize the student with the names and uses of the parts of engines, boilers, pumps, etc., and their attachments, and with their proper management. In addition to the text-book, trade catalogues and the technical journals are used to illustrate the more prominent types and to teach the modern methods of management. Practical instruction is given in running engines and boilers.

Valve Gears.—The action of valves is studied and the Zeuner diagram as applied to the Stephenson link, and to the radial and automatic cut-off gears. The ball governor is considered. Much of the work is done on the drawing board.

Thermodynamics.—This includes thermodynamics of gases, of saturated and superheated steam, with application to steam and gas engines and injectors.

Pumps and Hydraulic Motors.—Pumps, both reciprocating and rotary are studied, but the time is given chiefly to turbine wheels.

Transmission of Power.—This includes a study of the arrangement of machinery and methods of transmitting power, both mechanical and electrical. Visits are made to engineering plants in the neighboring cities, and written descriptions and sketches are required of the arrangement of the machinery, shafting, belting, etc.

Laboratory Courses in Steam Engineering.—Management of engines and boilers is first taught. Next follows measurement of weights, volume, area, temperature, etc., use of indicator, tests of pressure gauges, of quality of steam, power and efficiency tests of steam and gas engines, boilers, injectors, etc. The quality of lubricating oils, amount of friction, etc., is experimentally determined and the power used by machines is measured. *Hydraulic experiments* cover flow of water over weirs, through tubes, efficiency of pumps, etc.

ELECTRICAL ENGINEERING.

As a preparation for these courses, a course in elementary Electricity and Magnetism is given in the Junior year.

Electrical Measurements.—Class-room instruction includes construction and calibrations of testing instruments, the measurement of currents, potential, resistance, capacity, insulation, etc. Some time is given to Photometry.

Laboratory Work closely follows the classroom instruction. At first very close supervision is given to the work, that correct methods of using the apparatus may be acquired, after which the student is left more and more to his own resources in order that he may gain confidence in himself.

Direct Current Dynamo-Electric Machinery.—The laws of electro-magnets and of magnetic circuits are first studied and the principles are applied to dynamos and motors, the design and construction of the parts being taken up in detail. Attention is given to the characteristic curves and the efficiencies of the different types.

Alternating Current Machinery is next taken up, the design and construction of dynamos, motors and transformers being treated as in direct current work.

Laboratory Work.—After management of dynamos has been acquired, time is given to the electro-magnet and tests of reluctance, inductance, hysteresis and leakage are made. Characteristic curves and efficiencies are found for different type machines. On account of the growing importance of storage batteries considerable time is given to their construction and management.

Applied Electricity.—A study is made of electricity as applied to domestic purposes, including electric bells, annunciator work, gas lighting, fire and burglar alarms, etc., electric telegraph and telephones. Attention is given to electro-deposition of metals, including electro-plating, electro-typing and smelting and refining metal.

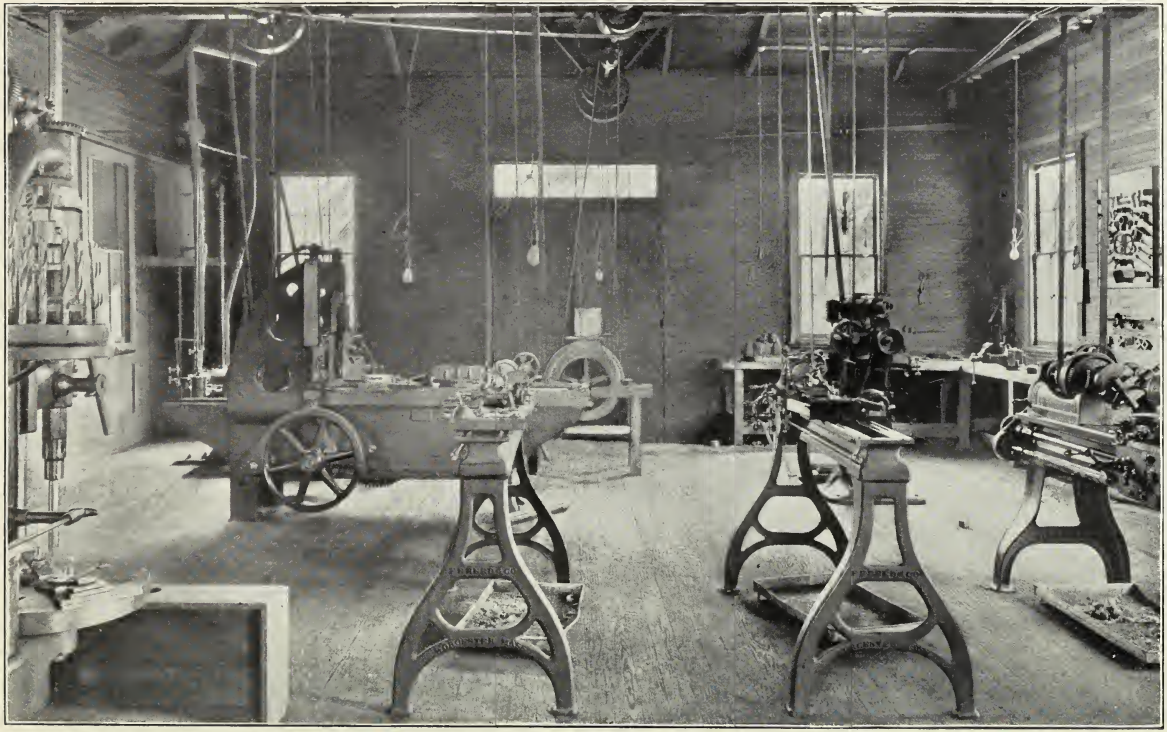
Electric Lighting and Transmission of Power.—A study is made of the arrangement of generating plants, erection of distributing lines and interior wiring on the different systems, arc and incandescent lamps, distribution of power to mills, etc., from central plants, electric railways, including lines, circuits, and motors with methods of control. This work is supplemented by visits of inspection to lighting and power plants and by constant reference to the current electric journals.

Laboratory Work includes wiring, testing of lines, lamps, etc., and general management of electrical apparatus.

SHOP-WORK.

The work in the shops is designed to teach the construction and use of tools and machines employed in mechanical work and as a preparation for the study of machine design in the Senior year. The shops are managed as nearly as possible like those of an actual manufacturing plant. In arranging the work care is taken that the class-room and shops may be mutually helpful. Thus, in wood-working, the technical names and reasons for the different forms of joints, splices, frames, etc., constructed, are pointed out, and in the iron work the different fastenings, methods of locking nuts, etc., are constructed and explained. This method is followed throughout the course, while in the class-room reference is always made to the application in the shops of the principles discussed, drawing and descriptions being required if necessary.

Each student is required to complete a graded series of exercises in carpentry, wood-turning, pattern-making, moulding,



END OF MACHINE SHOP.

UNIVERSITY OF ILLINOIS

forging and machine-shop work, designed to make him, upon their completion, able to perform any ordinary operation in a workmanlike manner. Each class then more or less completely builds some machine as time will permit. All work is done from blue-prints made by the students. Manual skill is desired and required and all work must be done in a manner satisfactory to the Instructor before it will be accepted. At the same time particular stress is laid on a thorough knowledge of the construction and care of each tool and machine, and the kind of work to which it is best adapted, together with the special work possible to perform on it. Combined written and oral examinations are held three times during the first term and twice during the second and third terms. These examinations cover the work of the terms and are extremely valuable in that they compel close attention to the instruction given and indicate to the Instructor the knowledge each student has failed to acquire, thus enabling him to give just such instruction as is needed.

The courses in detail are as follows:

(a) Bench Work in Wood.—This includes the nature and use of tools, work with saw, plane, auger, bit, chisel and kindred tools, in making different joints, such as timber splices, mortises, tenons, mitres, dovetails, etc., frames, light cabinet work and roof and bridge trusses.

(b) Wood-Turning.—Comprises use of lathe tools in straight and compound turing in soft and hard woods, involving caliper work, hollow turning, turning to template, screw-plate and chuck work.

(c) Iron and Steel Forging.—This includes exercises in heating, bending, upsetting, welding, the making and tempering of punches, chisels, machine-cutting tools. Brief instruction is given in soldering, brazing and riveting.

(d) Bench Work in Iron.—This comprises work on cast iron, wrought iron and brass,—chipping, use of file and scraper in producing flat and curved surfaces, fitting, slotting, dovetail work, screw-cutting with taps and dies, pipe-fitting.

(e) Machine Work in Iron.—This includes straight and taper turning, facing and screw cutting on lathe, drilling and boring on lathe and drill press, surfacing, straight, spiral, end and gear cutting on milling machine, planing, reaming, grinding, polishing, etc.

After the regular series of exercises in iron work is completed further practice is given in the building of apparatus and complete machines from designs and drawings made at the College.

(f) Pattern Making and Moulding.—A series of patterns including patterns for pipe joints, valves, couplings and pillow-blocks, etc., is first completed and by means of these the actual process of moulding is illustrated. More complex patterns and patterns for actual machines to be constructed in the shops are then made and during the last term of the Senior year the students construct patterns from their own designs and drawings.

(g) Fitting, Erecting and Aligning Machinery and Shafting.—This course is given during the Senior year.

(h) Visits of Inspection.—Visits of inspection are made each year to manufacturing plants in nearby cities, and notes and sketches made of the arrangement of shops and machinery, special tools and processes and the methods of carrying on work.

(i) Special Course for Agricultural Students.—This course is adapted especially to the needs of agricultural students and includes in wood—use and care of tools, general carpentry, joints, timber splices, framing; in iron—forge work, including heating, bending, welding, making and tempering of tools, soldering, riveting, and bench work, including chipping and filing, screw-cutting with taps and dies. Practical instruction is given in managing engines and boilers.

Military Science and Tactics.

By the Act of Congress, July 2d, 1862, establishing colleges for the benefit of Agriculture and the Mechanic Arts, military science and tactics become a part of the work of instruction. All students not in the Senior class are required to take military instruction and drill, unless specially excused by the Faculty on account of physical disability or because of conscientious scruples on the part of their parents.

In Delaware College the military instruction and drill are in charge of an officer of the regular army. The course of instruction is both theoretical and practical.

The theoretical instruction, one hour a week, is confined to the winter term.

The first year's course consists of the Drill Regulations of the three arms of the U. S. Army, so far as each pertains to the practical instruction given in that arm.

The second year's course embraces "Notes on Military Science and the Art of War," and the preparation of the usual reports and returns pertaining to a company.

Lectures on military subjects are delivered throughout the year to those taking the course.

PRACTICAL INSTRUCTION EMBRACES

1. Military Gymnastics and Athletics.

2. Infantry.—The School of the Soldier, the Company and the Battalion, including the ceremonies of guard mounting, dress parade, reviews, and inspections.

3. Artillery.—The School of the Soldier dismounted, manual of the piece, etc.

4. Signaling.—Transmission of messages by means of flags.

The National Government supplies all arms, ammunition and equipments; and the College, all military text-books. The only expense incurred by the student in taking this course is his uniform. The uniform adopted is a cadet gray,—strong, neat, and serviceable,—costing from $13.50 to $16.50.

LIBRARIES.

The combined libraries of the college contain about 10,000 volumes, about 1,000 bound volumes having been added during the past year.

Each department of instruction has its own library of reference books in its laboratory or class rooms and under the immediate supervision of the professor in charge, from which students may draw books for use in connection with their work.

The general library in which are most of the works on literature, history, economics, philosophy, etc., is, together with the reading-room open to students at all times of the day and evening.

This library is classified on the Dewey system and a shelf-list intended to serve also as a catalogue has been made during the year. New books are continually being added so that the library may fairly represent current thought on all subjects con-

nected with the college work. The library has been designated as one of the depositories for the public documents of the United States government and from this source receives many valuable publications.

Several friends of the college have made valuable additions to the library by the presentation of books, magazines and pictures.

Reading Room.

On the second floor of the Recitation Hall a large well-lighted room is given up for a reading-room and general library. Ample seating capacity is provided for as many students as may wish to use the room at any time, and the following list of periodicals will show the character and scope of the literature provided.

The most useful of these periodicals are bound and placed on the library shelves thus becoming a valuable part of our book collection.

Educational Review.
School Review.
Educational News.
Education.
Journal of Education.
Forum.
North American Review.
Review of Reviews.
Critic.
American.
Outlook.
Nation.
Fortnightly Review.
Contemporary Review.
Nineteenth Century.
Athenaeum.
Saturday Review.
Quarterly Review.
Weekly Times. (London.)
Punch.
Revue des Deux Mondes.
Journal des Debats.

L'Illustration.
Le Monde Illustré.
Illustrirte Zeitung.
Book Reviews.
Literature.
Scientific American Supplement.
Popular Science Monthly.
Sanitarian.
Nature.
Science.
American Naturalist.
Popular Astronomy.
Journal of the Society of Arts. (London.)
Army and Navy Register.
Farmers' Voice.
American Grange Bulletin.
Practical Farmer.
Agricultural Epitomist.
Musical Record.
Advocate of Peace.
Double Cross.
Presbyterian.
Peninsula Methodist.
Delaware Churchman.
Congressional Record.
Harper's Weekly.
Harper's Monthly.
Scribner's.
Century.
Atlantic.
McClure's.
Outing.

Besides these publications which are open to students at all times, each department has several technical journals available to those interested. The list of these journals follows:

Journal D' Agriculture Pratique.
Annales Agronomiques.
Physical Review.
Astro-Physical Journal.
Zeitschrift für Physikalischen and Chemischen Unterricht.
Zeitschrift für Instrumenten-kunde.

Annalen der Physik und Chemie.
Philosophical Magazine.
American Mathematical Journal.
Annals of Mathematics.
Mathematical Gazette.
American Mathematical Monthly.
Bulletin of the American Mathematical Society.
Railroad Gazette.
Engineering Record.
Engineering News.
Engineering Magazine.
The National Builder.
Home Study Magazine.
Municipal Engineering.
Digest of Physical Tests.
Proceedings of American Society of Civil Engineers.
Journal of the Association of Engineering Societies.
Wisconsin Engineer.
L'Electricien.
Electrical Engineer.
Western Electrician.
Electrical World.
Engineering.
Power.
American Machinist.
Scientific American.
American Journal of Science.
Proceedings of the Royal Society.
Proceedings of the Royal Institution.
Engineering and Mining Journal.
Zeitschrift für Krystallographie und Mineralogie.
Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege.
Neues Jahrbuch für Mineralogie, Geologie und Paleontologie.
Tschermak's Mineralogische und Petrographische Mittheilungen.
Meyer's Jahrbuch der Chemie.
Jahres-bericht für Hygiene.

General Remarks.

Apparatus.—The various scientific departments of the College are well equipped with modern apparatus of the most approved form, and additions are made as the needs of instruction and advances of science demand.

Laboratories.—The several scientific departments have large, well lighted laboratories supplied with water and gas, and furnished with ample equipment of apparatus and appliances. The importance of laboratory work in scientific study is duly recognized, and the instruction is greatly enriched in effectiveness and increased in disciplinary value.

The Work-Shops.—The work-shops* contain iron and wood-working tools sufficient for a thorough course in the best modern shop practice. There are also housed in the shops, engines, dynamos, motors and other necessary appliances for mechanical and electrical testing and measurement.

Mineralogical Cabinet.—The College possesses valuable geological and mineralogical collections systematically arranged and readily accessible for use.

Natural History Collections.—The College already has the nucleus of a Museum of Natural History, in the shape of the collections of invertebrates and skeletons, mentioned under Zoölogy.

In addition to this material it has several Auzoux models illustrating different forms or parts of animals.

In order that these collections may be increased and thus become more valuable to all connected with the institution, we request the friends of the College who may come into possession of specimens suitable for a museum to correspond with us relative to their preservation. It is especially desirable for us to build up a museum which shall contain representatives of all animals and plants found wild in Delaware.

Department Libraries.—Each department of the College possesses a special library of standard books and journals under the immediate care of the professor in charge. These libraries are open to the students at all times during College hours.

*The Work-shops and their contents were destroyed by fire on April 26th, 1898. The shops will be rebuilt and equipped before the opening of the College in September.

Visits to Manufactories.—Opportunities will be given each year for students to visit the excellent manufacturing establishments of Wilmington, Chester, Baltimore and Philadelphia, when they, in company with a competent professor, may witness and study the practical application of science, as illustrated in the most successful manufactories in the country.

State Chemist.—The professor of Chemistry in the College is by Legislative Enactment Ex-officio State Chemist for Delaware.

Examinations.

Examinations in all subjects are held at the close of each term and are conducted either in writing, or orally, as the nature of the subject may require or as the professor may prefer. Review examinations are also held at other times whenever, in the judgment of the professor, the objects of instruction may be promoted by such means. The examinations are designed not as mere tests of the student's knowledge, but as a valuable training in rapid, concise and accurate expression. They serve as a valuable means of giving the student a ready command of his mental powers and, by encouraging a review of a period of work, they give him a broader view and a firmer hold of the different subjects of study.

In determining a student's fitness to proceed to a higher class great weight is given to the character of his performance of recitation room duties. The results of the term examinations are comcombined with the recitation records, but in fixing the student's standing the quality of his recitation work is the weightier factor.

In the case of failure to pass in any study, the student must satisfy the professor in charge that he has made up his deficiency before the condition can be removed. Reasonable opportunities will be given him to show by examination that he has qualified himself to take good standing in the subject in which he was found deficient.

If at the beginning of any year a student's record of the preceding year shows that he is deficient in too many subjects to maintain his class standing he will not be advanced, but will be required to go over the work in which he has failed. If such condition is brought about by idleness and neglect, change of habit or withdrawal from the College will be required. Every encourage-

ment will be given to the willing and earnest student, but his best interests demand that he shall not undertake what he is not prepared to perform.

Reports.—At the close of every term a report of each student's combined recitation and examination record will be sent to his parent or guardian. These reports show the course of study the student is pursuing and the class in which he is enrolled. Parents are urged to give them close attention and to co-operate with the faculty in correcting habits of idleness and indifference when the reports indicate any lack of attention to duty.

Attendance.—Students are required to be regular in attendance upon College duties.

Any student who does not return punctually at the opening of a term must present a satisfactory excuse, in writing, from his parent or guardian, and sustain an examination in the studies pursued by his class during his absence. The same rule applies to such as lose a part of their course by absence during the term unless specially excused by the Faculty.

Students are required to occupy such rooms as may be assigned to them by the President, and are not allowed to remove without his permission.

Religious Instruction.—The College is in no sense sectarian, but every student is expected to attend public worship at least once each Sunday at such place as the parent or guardian may select. All the students, except such as reside at too great a distance, are required to be present at the daily morning prayers.

Government.—Discipline is administered by the Faculty. The government is mild but firm. Sound principles of morality are inculcated, and sentiments of manliness, honor, and self-respect are impressed upon the students. Misbehavior is reprimanded privately, and for gross disorder the parent or guardian is notified and requested to remove the offender. Suspension or expulsion is the last resort.

Students are not allowed to visits saloons or other places of resort that might injuriously affect their morals.

Under ordinary circumstances students will not be permitted to visit neighboring cities and towns without the permission of their parents or guardians, or of the President of the College. Permission granted by parents or guardians must be written and deposited with the President.

Every student, upon entering the College is furnished with a printed copy of the laws and regulations for the government of the institution.

EXPENSES.

	1st Term.	2d Term.	3d Term.
Tuition	$24.00	$18.00	$18.00
Fuel for Oratory and Recitation Rooms	1.00	.75	.25
Janitor's fee for care of Recitation Rooms, etc	1.50	1.25	1.25
Use of Library	1.00	.75	.75
Incidental Expenses	1.00	.75	.75
Total for Students not rooming in College	$28.50	$21.50	$21.00
" " those having Free Scholarships	4.50	3.50	3.00

Extra for Students Rooming in the College.

Room Rent	$ 4.00	$ 3.00	$ 3.00
Heat for Rooms	4.00	3.00	1.00
Janitor's Wages for care of Rooms	1.50	1.25	1.25
Total for Students rooming in the College	$38.00	$28.75	$26.25
" " those having Free Scholarships	14.00	10.75	8.25

TUITION IS FREE FOR ALL STUDENTS FROM DELAWARE.

In addition to the foregoing charges, each student, upon entering the College, will pay $5.00 as an entrance fee.

Students in Chemistry are charged a fee of $2.50 a term for such articles as are consumed in making experiments.

The students rooming in the College dormitory have formed an association, in which table board is furnished at less than $3.00 a week.

Room furniture, including bedstead, mattress, bolster, washstand, study-table and chairs is rented to students at the rate of $3.00 a year for the use of the furniture when two room together, or $5.00 a year when the student rooms alone. Students may furnish their own rooms if they prefer. They provide for themselves lights, books, and stationery.

PAYMENT.—College bills for each term are due and payable in advance. In case of prolonged absence from sickness, casualty, or other sufficient cause, a proper amount of the term payment will be refunded to the student.

Damages are assessed on the perpetrators if discovered; otherwise on all students.

All arrearages must be paid or provided for before a candidate for graduation shall be entitled to receive a diploma.

PRIZES.

THE BISHOP COLEMAN PRIZE.

The Rev. Leighton Coleman, S. T. D., Bishop of Delaware, offers an annual prize of twenty-five dollars to be awarded to the member of the graduating class having in all respects the best standing in the Senior year.

THE ALUMNI PRIZE.

The Alumni Association offers an annual prize of thirty dollars for the best declamation at the public contest open to all students below the Senior Class. Should the merits of several contestants make it difficult to decide in favor of anyone, the prize may be divided.

THE SOPHOMORE ENGLISH LITERATURE PRIZE.

John P. Cranford, Esq., of New York City, offers a prize of fifty dollars to the student of the best standing in English Literature in the Sophomore Class of the year 1897-'98.

LECTURES.

The following course of lectures was given during the year 1897-'98.

George Haven Putnam, Esq., New York.—"The History of Property Rights in Literary Productions."

The Rev. Leighton Coleman, S. T. D., Bishop of Delaware.—"Reminiscences of a Recent Trip Abroad."

The Rev. Henry Baker, D. D., Wilmington.—"Abraham Lincoln."

Henry C. Conrad, Esq., Wilmington.—"The Four Constitutions of Delaware and the Men Who Made Them."

The Rev. W. L. S. Murray, D. D., Wilmington.—"Cavern Curiosities."

Dr. L. M. Underwood, Columbia University.—"Victor Hugo and His Masterpiece."

*Degrees Conferred at the Annual Commencement held June 16th, 1897.

GRADUATE DEGREES.

Master of Arts.

THOMAS SIMPSON HOLT, B. A., 1894.

Bachelor of Arts.

JAMES KILGORE BURNITE,
WILLIAM ELLIS,
SAMUEL LUCAS CONNER,
ERNEST WAITMAN SIPPLE.

Bachelor of Science.

IRA LISTON PIERCE.

Bachelor of Electrical Engineering.

GEORGE GRIFFITH HENRY,
EDWIN TERRY PHILLIPS.

Bachelor of Mechanical Engineering.

LEE OMAHUNDRO WILLIS.

Prizes Awarded at the Commencement of 1897.

"THE BISHOP COLEMAN PRIZE,"

Twenty-five Dollars.

WILLIAM ELLIS.

THE ALUMNI PRIZE FOR ELOCUTION.

Thirty Dollars.

1st Prize, ANDREW MARVEL.
2d Prize, R. OWEN MASON.
3d Prize, EVERETT C. JOHNSON.

ROBERT'S MEDAL FOR BEST DRILL.

COMPANY A., E. T. PHILLIPS, *Captain*.

*In the last catalogue the name of George D. Truitt, who received the degree of B. A., at the Commencement held June 17th, 1896, was inadvertently omitted from the list of graduates.

Graduate Students.

NAMES.	COURSES.	RESIDENCES.
Conner, Samuel Lucas	Languages,	Wilmington.
Pierce, Ira Liston	Chemistry,	Wilmington.
Smith, Edward Lawrence	Languages,	Newark.

Senior Class.

Brewster, Joseph Fergus	Lat. Sci.,	Chester, Pa.
Constable, Henry Lyttleton	Special,	Elkton, Md.
Craig, James Vance	Elect. Eng.,	Newport.
Davis, George Norton	Lat. Sci.,	Laurel.
Folk, George Edgar	Classical,	Wilmington.
Hellings, Edmund Spenser	Lat. Sci.,	Wilmington.
Krause, Edwin	Elect. Eng.,	Osceola Mills, Pa.
Morris, Hugh Martin	Lat. Sci.,	Greenwood.
Mullins, John Timothy	Lat. Sci.,	Faulkland.
Pratt, Louis Lockwood	Elect. Eng.,	Milford.
Springer, Lewis Reese	Civil Eng.,	Wilmington.
Tosney, Emmet Lawrence	Elect. Eng.,	Delaware City.

Junior Class.

Armstrong, Howard Malcolm	Lat. Sci.,	Cooch's Bridge.
Baynard, Samuel Harrison, Jr.,	Lat. Sci.,	Wilmington.
Baxter, Thomas George	Special,	Slaughter.
Brown, Joseph West	Elect. Eng.,	Odessa.
Du Hadway, Louis	Lat. Sci.,	Milton.
Green, Harold	Mech. Eng.,	Middletown.
Johnson, Everett Clarence	Lat. Sci.,	Selbyville.
Lewis, Charles Edwin	Elect. Eng.,	Newark.
MacSorley, Frank Olin	Lat. Sci.,	Newark.
Marshall, Andrew Donnell	Classical,	Milford.
Mason, Roger Owen	Lat. Sci.,	Newark.
McCabe, Edward Henry, Jr.,	Lat. Sci.,	New Castle.
McCabe, Harley King	Lat. Sci.,	Selbyville.
Medill, George Lodge	Lat. Sci.,	Newark.
Reed, Richard Paul	Civil Eng.,	Wilmington.
Stewart, James Lamont	Lat. Sci.,	Newark.
Vickers, George	Special,	Chestertown, Md.
Vickers, Harrison Wilson, Jr.	Classical,	Chestertown, Md.
Wells, George Harlan	Lat. Sci.,	Elkton, Md.
Wood, Willard Franklin	Mech. Eng.,	Newport.
Woodall, Edward, Jr.,	Civil Eng.,	Royal Oak, Md.

Sophomore Class.

NAMES.	COURSES.	RESIDENCES.
Ayars, Edward James	Civil Eng.,	Wilmington.
Conner, William Henry	Lat. Sci.,	Wilmington.
Constable, Reginald	Classical,	Elkton.
Hartman, Alfred Hanson	Civil Eng.,	Wilmington.
Hirsh, William Louis	Elect. Eng.,	Osceola Mills, Pa.
Hyland, Charles Scott	Civil Eng.,	Wilmington.
MacSorley, James Roe	Lat. Sci.,	Newark.
Maier, Harry Ludwig	Civil Eng.,	Wilmington.
Marvel, Andrew	Lat. Sci.,	Georgetown.
McKeon, Thomas Becker	Elect. Eng.,	Newark.
Nivin, Thomas Rankin	Lat. Sci.,	Strickersville, Pa.
Reybold, Henry Wilson	Elect. Eng.,	Delaware City.
Sentman, Jacob Elmer	Lat. Sci.,	Newark.
Sharp, Hugh Rodney	Lat. Sci.,	Lewes.
Tinney, William Scott	Special,	Philadelphia, Pa.
Trotter, West Alexander	Lat. Sci.,	Wilmington.
Vansant, Harvey Lee	Civil Eng.,	Highland.
Walter, Ebe, Jr.,	Lat. Sci.,	Frankford.
Woodward, George Daniel	Elect. Eng.,	Wilmington.

Freshman Class.

Armstrong, Eugene Victor	Gen. Sci.,	Cooch's Bridge.
Baker, Elisha Monroe	Classical,	Selbyville.
Cann, Richard Thompson, 3d,	Lat. Sci.,	Kirkwood.
Cheney, Lowther	Classical,	Henry Clay.
Crothers, Emerson Ralph	Special,	Oakwood, Md.
Crothers, Omar	Special,	Oakwood, Md.
Davis, Elmer Garfield	Elect. Eng.,	Newark.
Eastburn, Granville Worrall	Lat. Sci.,	Pleasant Hill.
Evans, Fred	Civil Eng.,	Henry Clay.
Grant, Archibald	Classical,	Granite, Md.
Griffin, Edgar Byron	Lat. Sci.,	Newark.
Hughes, Harry Blades	Special,	New Castle.
Knox, Joseph Nevins	Civil Eng.,	Henry Clay.
Marshall, William, Jr.,	Classical,	Milford.
McComb, Henry Goodman	Lat. Sci.,	Wilmington.
McCoy, John Willard	Lat. Sci.,	New Castle.
McDonald, Cecil Clark	Lat. Sci.,	Newark.
McMullin, William Norman	Lat. Sci.,	St. Georges.

NAMES.	COURSES.	RESIDENCES.
Messick, John Burton	Classical,	Shortly.
Naudain, William Peoples	Agriculture,	Stanton.
Ott, Samuel J.	Mech. Eng.,	Wilmington.
Paxson, Harold Knight	Classical,	Summit Bridge.
Rickards, Joseph Waples	Gen. Sci.,	Ocean View.
Scott, Henry Livingston	Special,	Elkton, Md.
Smith, Lawrence De Haven	Lat. Sci.,	Newark.
Smith, William Henry	Gen. Sci.,	Newark.
Stockly, Charles Daniel	Lat. Sci.,	Smyrna.
Tunnell, Harry Edwin	Elect. Eng.,	Georgetown.
Tunnell, Herbert Rodney	Mech. Eng.,	Georgetown.
Ward, George William	Elect. Eng.,	Cherry Hill, Md.
Whann, John Gilbert	Lat. Sci.,	Newport.
Wolf, Theodore Rudolph, Jr.,	Mech. Eng.,	Newark.

Unclassified.

Baldwin, William Ray . . . . . Elkton, Md.

Short Course in Agriculture.

Boulden, John . . . . . Elkton, Md.
Nivin, John . . . . . Newark.
Sullivan, James Augustine . . . . . Iron Hill, Md.

MILITARY ORGANIZATION.

Commandant of Cadets,

First Lieutenant WALTER H. GORDON, 18th U. S. Infantry.

Cadet Major, LOUIS L. PRATT.

Adjutant,
J. T. MULLINS.

Sergeant Major,
W. RAY BALDWIN.

COMPANY A.

Captain,
J. V. CRAIG.

1st Lieutenant,
J. F. BREWSTER.

1st Sergeant,
E. C. JOHNSON.

Sergeants,
R. P. REED,
GEO. L. MEDILL,
J. L. STEWART.

Corporals,
A. MARVEL,
T. B. MCKEON,
T. R. NIVIN,
E. J. AYARS.

COMPANY B.

Captain,
L. R. SPRINGER, Jr.

1st Lieutenant,
E. KRAUSE.

1st Sergeant,
JOSEPH W. BROWN.

Sergeants,
E. H. MCCABE, Jr.,
R. O. MASON.

Corporals,
R. CONSTABLE,
H. L. VANSANT,
W. A. TROTTER.

YOUNG MEN'S CHRISTIAN ASSOCIATION.

President, THOMAS GEORGE BAXTER.
Vice-President, H. K. MCCABE.
Recording Secretary, R. OWEN MASON.
Corresponding Secretary, HUGH M. MORRIS.
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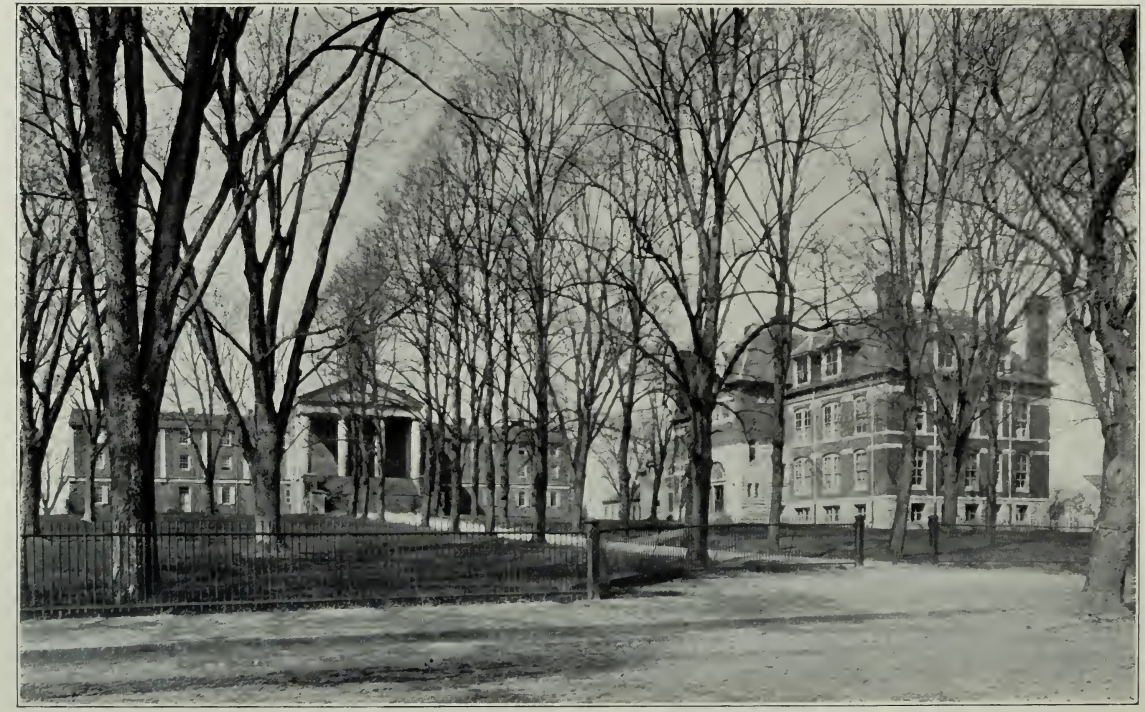

FRONT VIEW OF DELAWARE COLLEGE.

CATALOGUE

OF THE

OFFICERS AND STUDENTS

OF

DELAWARE COLLEGE,

NEWARK, DELAWARE,

FOR THE YEAR 1898-99.

AND ANNOUNCEMENTS

FOR THE YEAR 1899-1900.

THE JOHN M. ROGERS PRESS,
WILMINGTON, DEL.
1899.

CALENDAR 1899.

June 12–19—Annual Examinations.
June 18—Sunday, Baccalaureate Sermon, 8 p. m.
June 19—Monday, Class Day Exercises, 2.30 p. m.
Oratorical Contest, 8 p. m.
June 20—Tuesday, Meeting of the Board of Trustees, 11 a. m.
Anniversary of the Athenæan Society, 8 p. m.
June 21—Wednesday, Commencement Exercises, 10.30 a. m.
Meeting of the Alumni, 2.30 p. m.
Exhibition Drill, 4 p. m.
Anniversary of the Delta Phi Society, 8 p. m.
June 23–24—Examinations of Candidates for Admission.

SUMMER VACATION.

FALL TERM.

Sept. 12–13—Entrance Examinations beginning 10 a. m., Tuesday, September 12th.
Sept. 14—Thursday, 8.50 a. m., College Work begins.
Dec. 18–22—First Term Examinations.
Dec. 22—Friday, First Term ends.

WINTER VACATION.

WINTER TERM, 1900.

January 2—Tuesday, 8.50 a. m., Second Term begins.
March 26—Monday, 11 a. m., Meeting of the Board of Trustees.
March 26–29—Second Term Examinations.
March 29—Thursday, Second Term ends.

SPRING RECESS.

SPRING TERM.

April 3—Tuesday, 8.50 a. m., Third Term begins.
June 11–18—Annual Examinations.
June 17—Baccalaureate Sermon.
June 18—Monday, Class Day Exercises.
Oratorical Contest.
June 19—Tuesday, Meeting of the Board of Trustees.
Anniversary of the Athenæan Society.
June 20—Wednesday, Commencement Exercises.
Meeting of the Alumni.
Exhibition Drill.
Anniversary of the Delta Phi Society.

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FREDERICK H. ROBINSON, C. E.,
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WILLIAM H. BISHOP, B. S.,
Librarian.

*Died February 23, 1899. Lee O. Willis, B. M. E., in charge since Mr. Hibberd's illness, November, 1898.

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DELAWARE COLLEGE.

DELAWARE COLLEGE is situated at Newark, a quiet, well-ordered, and hospitable village of fifteen hundred inhabitants in the North-western part of the State. Newark is connected with Philadelphia, Wilmington, Baltimore and Washington by the Pennsylvania, and Baltimore and Ohio railroads, and there are few points in Delaware or in the Peninsular counties of Maryland distant from the village more than four hours by rail. The region about Newark is one of the most healthful and beautiful on the Atlantic slope, and the site of the College, near the center of the town, is one of unusual charm. The village has a supply of excellent water and is lighted by electricity.

Delaware College was chartered in 1833 by Act of the Delaware Legislature, and the doors of the College were first opened to students in May of the following year. The College had been doing for a quarter of a century an important work, not only for Delaware, but as well for neighboring parts of Pennsylvania and Maryland, when by a series of misfortunes, she was forced in the spring of 1859 to close her doors.

Eleven years later the College was resuscitated, having meanwhile been designated by Act of the Delaware Legislature as a beneficiary under the Act of Congress apportioning to each of the several States large areas of public lands to form the basis of endowments for Colleges especially devoted to the teaching of Agriculture and the Mechanic Arts, and Military Tactics. This Act of Congress commonly known as the "Morrill Bill" from its originator, Senator Morrill of Vermont, declares that the Colleges made beneficiary under its provisions shall have as their leading object, " without excluding other scientific and classical studies and including Military Tactics, to teach such branches of learning as are related to Agriculture and the Mechanic Arts * * * * * * in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." In consideration of the adoption and establishment of Delaware College as the institution to be provided by the State of Delaware in accordance with the provisions of the Act of Congress in question, "a joint and equal interest in the grounds, buildings, libraries and vested funds of the College proper" was conveyed to the State

RECITATION HALL.

of Delaware and equal representation upon the Board of Trustees was given the State.

The Board of Trustees, when full, consists of fifteen members representing the original Board, and fifteen members on the part of the State appointed by the Governor, five from each of the three counties. The Governor of the State and the President of the College are members *ex-officio*.

In 1889, by Act of the Delaware Legislature, the Delaware College Agricultural Experiment Station was established in connection with the College under the provisions of an Act of Congress approved March 2, 1887, commonly known as the "Hatch Bill," appropriating $15,000 annually for the purpose of "acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture and to promote scientific investigation and experiment respecting the principles and applications of Agricultural science under direction of the College or Colleges established in each of the States and Territories" in accordance with the provisions of the "Morrill Bill."

Delaware College is beneficiary also under a further Act of Congress, known as the "New Morrill Bill," approved August 30th, 1890, which appropriated for the year then current $15,000 to each State for the "Land Grant Colleges" and provided for the increase of the appropriation by $1,000 each year until it should reach $25,000 a year. Delaware College receives annually four fifths of this appropriation, one fifth, in accordance with the provisions of the bill, being applied to the maintenance and support of the College at Dover for the education of colored students.

The appropriations provided for in this act are to be applied "to instruction in Agriculture, the Mechanic Arts, the English Language and the various branches of mathematical, physical, natural and economic sciences with special reference to their applications in the industries of life, and to the facilities for such instruction."

Stimulated by the increased income provided by this last Act, Delaware College has within the past seven years enlarged her corps of instructors and greatly increased her equipment of apparatus and appliances, so that she is now vastly better able than ever before in her whole history to perform her appointed duty.

The buildings of the College, situated in an ample and

beautiful campus, shaded by trees as old as the institution itself, consist of the Dormitory, a large brick structure originally the sole College building, and still occupied in part by laboratories, the old library, the literary societies and recitation rooms; Recitation Hall, a handsome brick building erected by the State in 1891; the wood-working shop and the machine shop, where are housed machinery and apparatus for a thorough practical course of instruction in the mechanic arts; the gymnasium and drill hall, which is amply equipped for indoor physical exercise.

The experiment Station occupies a building on the College grounds which contains offices, libraries and laboratories of the station workers. The Station has also a large green-house, with laboratory adjoining, in the rear campus, and several buildings used for storage and other purposes in the conduct of the various lines of experimental work.

A considerable part of the rear campus is occupied as an athletic field and it affords excellent facilities for out-door sports and games.

The College buildings are heated by steam and are supplied with water by the town Water Works.

Tuition is free to all students from the State of Delaware, and the College thus constitutes a part of our system of free public instruction. She places within reach of the young men of the State a thorough collegiate training with no other cost than that of living and the provision of necessary books and a few inconsiderable fees to cover expenses incurred by the institution. Her work is laid out upon broad lines, and the culture of liberal learning and the practical usefulness of the applied sciences are equally emphasized in her scheme of education. While, in pursuance of the special aims of her organization, stress is laid upon those departments which build up good citizenship and useful manhood, the place so wisely provided in the foundation of the "Land Grant" Colleges is given to the refining graces and amenities of the older learning.

LITERARY SOCIETIES.

Two Literary Societies, each nearly as old as the College, are not only important adjuncts to the social life of the institution but extremely valuable aids in its educational work. The Athenæan and Delta Phi Societies occupy a place midway between the

literary societies of some larger colleges and the Greek Letter fraternities now widely extended throughout the college system of the United States. The two societies at Delaware College preserve the useful exercises common to most literary societies, and at the same time are strongly marked with the spirit of enthusiastic loyalty and brotherhood characteristic of the Greek Letter fraternities. There has never been a time when the Societies did not command the respect and enthusiasm of the undergraduates, and it is the uniform testimony of graduates that the Societies stood to them during their course as among the most important and valuable influences of the College. Each Society has a comfortable hall in the College dormitory, and each has a well chosen library covering the ground of general literature, history, biography, and popular science.

The Athenæan Literary Society, according to the testimony of its founders, was founded December 18th, 1834, about six months after the opening of the College. The Society's first constitution was adopted in February 1835, and the Society was incorporated by Act of the Delaware Legislature dated February 11th, 1881.

The Delta Phi Literary Society, which claims for itself somewhat greater age than its rival, was legally incorporated January 12th, 1835. The Society obtained a new charter from the Legislature of Delaware about 1871, and another in 1895.

So excellent is the influence of these organizations that the Faculty earnestly counsels every student to connect himself early in his course with one or the other.

COURSES OF STUDY.

The following courses of study leading to a degree are offered by the College.

1.—The *Classical Course*, leading to the degree B. A.

2.—The *Latin Scientific Course*, leading to the degree B. A.

3.—The *Agricultural Course*, leading to the degree B. S.

4.—The *General Science Course*, leading to the degree B. S.

5.—The *Civil Engineering Course*, leading to the degree B. C. E.

6.—The *Mechanical Engineering Course*, leading to the degree B. M. E.

7.—The *Electrical Engineering Course*, leading to the degree B. E. E.

There are offered, besides, a two years Course in Agriculture, not leading to a degree, and a short Winter Course in Agriculture covering the time of the Second Term.

Course 4 has been arranged for such students as may desire liberal training in Language and Science, but may not care to take the Latin of Course 2, or the Agriculture of Course 3.

In some of the Courses a considerable degree of freedom of election of subjects is permitted in the Junior and Senior years with the view of enabling students, who have determined upon their life-work, so to shape their undergraduate course as best to prepare them for the work of their chosen calling. The very nature of some of the Courses, notably those in engineering, precludes any great amount of elective freedom, but in the Senior years of these Courses opportunity is offered for advanced study along special lines. The great variety of Courses offered practically secures all the advantages of an elective system, while their largely prescribed form assures a broad foundation of general and liberal education. In all of the Courses, even in those that lead to immediately practical ends, the purely educational side of College life has been distinctly kept in mind.

In the assignment of the honors of the graduating class the Courses are of equal rank.

REQUIREMENTS FOR ADMISSION.

Candidates for admission to the Freshman Class must be at least sixteen years of age.

In all cases they must give satisfactory evidence of good moral character; and, when coming from another institution, they must present a certificate of honorable dismissal.

For entrance to the Course in Agriculture and Science, the General Science Course, and the several Engineering Courses, candidates must pass a thorough examination in English, History of the United States, American Literature, Geography, Arithmetic, Algebra through Quadratics, and plane Geometry.

Candidates for admission to the Latin Scientific Course must sustain an examination in Latin Grammar and Reader, Cæsar, and Vergil, in addition to the subjects mentioned above.

The requirements for admission to the Classical Course include, besides the foregoing subjects, Greek Grammar, and the first two books of Xenophon's Anabasis.

Examinations are not required of candidates from schools that have courses of study fully covering our entrance requirements, when it is ascertained that the instruction given in such schools really fits students for undertaking the work of the College. Candidates from schools to which this privilege is granted are required to present a certificate from the Principal, setting forth in detail the nature and extent of the work accomplished.

Ability to read at sight easy prose, and a knowledge of the elements of the grammar of either French or German will be required for all Courses except the Classical in the entrance examinations of 1902.

DETAILED EXPLANATION OF THE REQUIREMENTS FOR ADMISSION.

English.

Candidates for matriculation will be expected to show a fair knowledge of technical grammar, and to be able to express themselves in writing with reasonable accuracy as to spelling, punctuation and rhetorical form.

They will be expected to give evidence of acquaintance with Washington Irving's Sketch Book, Edgar Allan Poe's Tales, Nathaniel Hawthorne's Wonder Book, and Mosses from an Old Manse, and the best known short poems of William Cullen Bryant, Henry Wadsworth Longfellow, Oliver Wendell Holmes, and John Greenleaf Whittier, together with the chief events in the lives of these authors.

Young men preparing to enter the College are advised, in case they have not access to the complete works of the authors named, to consult some trustworthy bookseller with a view to obtaining in cheap form the masterpieces of American Literature, and those charged with the duty of preparing young men for the College are urged to use, as reading exercises in the advanced classes, selections from the works of the authors named.

United States History.

A good knowledge of the history of our country as contained in the ordinary text-books used in the schools is required.

Arithmetic.

Thorough preparation in arithmetic is necessary for beginning the work of any of the regular courses. Candidates are required

to pass an examination upon the whole of higher arithmetic. Great importance is attached to neatness, rapidity and accuracy in the solution of examples. Particular stress is laid upon readiness in dealing with fractions, decimals, percentage and square root. A working knowledge of the Metric System is very desirable.

Algebra.

A thorough acquaintance with the elementary operations of algebra, factoring, involution and evolution, radicals, fractional and negative exponents, simple and quadratic equations, is required. Candidates should possess the power of ready and accurate performance in ordinary algebraic processes, and of putting the language of simple problems into algebraic statement.

Plane Geometry.

Good preparation for entrance requires a year's study of plane geometry as given in the text books in common use.

Latin.

Cæsar, Gallic War, Books I-III; Vergil, Aeneid, Books I-IV; A thorough knowledge of Latin Grammar.

Greek.

Xenephon, Anabasis, Books I-II. A thorough knowledge of Greek Grammar.

ENTRANCE EXAMINATIONS.

Entrance examinations will be held at Newark on Friday and Saturday, June 23d and 24th, 1899, beginning at 9.30 A. M.

On the same dates, examinations will be held at Wilmington, Middletown, Smyrna, Georgetown, Seaford, Laurel, Milford, Dover and Lewes if any candidates shall notify the Secretary of the Faculty of their intention to appear at such places for examination. All applicants must present themselves on the first day named. The examinations will begin at 9.30 o'clock in the morning of each day.

Entrance examinations will be held at the College on Tuesday and Wednesday, September 12th and 13th, 1899.

Candidates desiring to do so can take part of the entrance examination in June and complete it at Newark, September 12th and 13th.

ENTRANCE TO ADVANCED STANDING.

Candidates for entrance to an advanced class in any of the courses are required to sustain examination upon all studies of the course up to the point at which they seek admission.

CHOICE OF STUDIES.

Students may, with the approval of their parents or guardians, enter any one of the departments; or they may take such select studies as they are prepared to pursue when circumstances make it advisable not to enter a regular course. Except in the case of mature students who may desire to do special work in any department, it is strongly urged that all applicants for admission prepare themselves for undertaking the work of a regular course.

Changes from one course to another can be made only at the opening of a term, with the approval of the Faculty and the consent of the parent or guardian.

Each student is required to have at least fifteen recitations, or their equivalent, weekly, unless specially excused for cause.

Students in choosing among the elective studies in the Department of the English Language and Literature and Political Science, may, with the approval of the Professor in charge, give to a single subject the total number of recitation periods assigned to the elective studies in any given term offered to such students by the Department.

DEGREES.

Students who have satisfactorily completed the *Classical*, or the *Latin Scientific* Course, are entitled to receive the degree of *Bachelor of Arts;* those who have, in like manner, completed the Course in *Agriculture and Science*, or the *General Science* Course are entitled to receive the degree of *Bachelor of Science;* those who have completed any of the Courses *in Engineering* will receive the degree of *Bachelor of Civil, Mechanical, or Electrical Engineering* according to the course pursued. Every candidate for graduation in any of the courses of study is required, in addition to having pursued successfully the prescribed course, to present before commencement week a satisfactory thesis upon some subject approved by the Faculty. Every candidate for graduation in any of the several Engineering Courses is required to present to

the Professor in charge of the course, on or before the first day of May next preceding the candidate's graduation, a carefully prepared written description accompanied by any necessary drawings, of some structure, machine, or process, which he may have examined.

Any person who has received the degree of Bachelor of Arts, or of Bachelor of Science, at this College or any other institution whose requirements for these degrees are equivalent to those of Delaware College, may become a candidate for the degree of Master of Science, upon the satisfactory completion of an approved course of study in any department or departments of instruction in this College, (any part of which course, shall, if required, be pursued *in residence*) and after the presentation of a thesis giving evidence of scholarly and original work, and when these conditions are entirely satisfied, the Faculty shall recommend such candidate to the Board of Trustees for the proper degree.

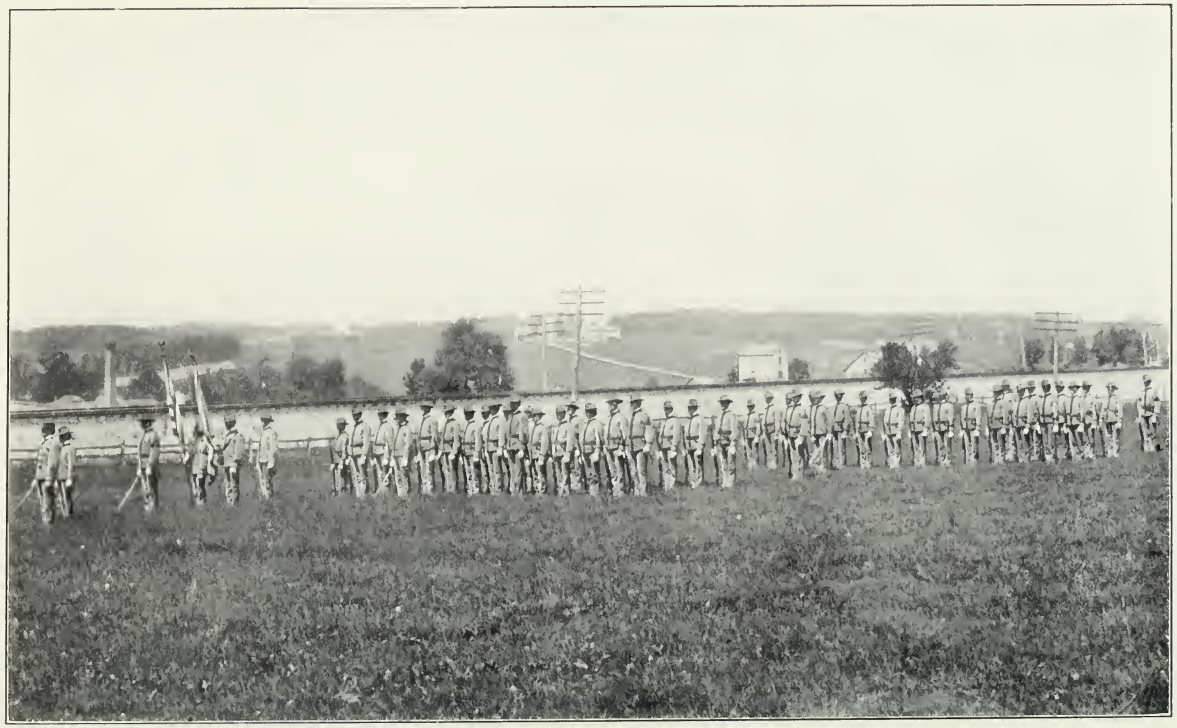
A graduate of any of the courses in Engineering will, after three years of practical and successful work as an Engineer, be entitled to the professional degree C. E., M. E., or E. E., according to the course he may have pursued. A candidate for any advanced degree in Engineering must present proper evidence of work done in his profession and must submit a satisfactory thesis upon some topic related to his calling.

Copies of all theses submitted for degrees must be left with the College as its property.

ELECTIVE STUDIES.

The work of the Freshman and Sophomore years in all courses is prescribed. In the Junior and Senior years of some courses considerable liberty of election is permitted. Students in the Junior year are required to take nineteen to twenty periods a week including military drill. In the Senior year not less than eighteen periods will be required in those courses in which the entire amount of work is not prescribed. At the close of the Sophomore year students in such courses will elect, with the approval of the Faculty, sufficient work to make up the required number of recitation periods in the Junior year.

The basis of election must be a proper observance of coherence and sequence of studies. Any general subject begun must



CORPS OF CADETS.

be taken at least one year. The Elective work of the Senior year will naturally be largely determined by the work elected in the Junior year, and the studies selected must be submitted to the Faculty for approval at the close of the Junior year. Selection must be made from the list of studies offered for the Senior year, or such others as the Faculty may be willing to add to those offered.

VALUATION OF LABORATORY PERIODS.

In work not requiring outside preparation two and one-half periods are counted as one.

I. Outline of the work of the CLASSICAL COURSE.

FRESHMAN YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Rhetoric	2.0		
History of the English Language	1.0	1.0	
English Composition *	1=0.4	1=0.4	1=0.4
Elocution	1=0.4	1=0.4	1=0.4
American Politics		1.0	3.0
Civil Government		1.0	
German or French	2.0	2.0	2.0
Latin	4.0	4.0	4.0
Greek	4.0	4.0	4.0
Algebra and Geometry	5.0	5.0	5.0
Drill	3=1.2	3=1.2	3=1.2
	20.0	20.0	20.0

SOPHOMORE YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	2.0	2.0	2.0
English Literature	2.0	2.0	2.0
Composition *	1—0.4	1—0.4	1—0.4
Elocution	1—0.4	1—0.4	1—0.4
German or French	2.0	2.0	2.0
Latin	3.0	3.0	3.0
Greek	4.0	4.0	4.0
Trigonometry, Surveying and Analytic Geometry †	4.0	4.0	4.0
Drill	3—1.2	3—1.2	3—1.2
	19.0	19.0	19.0

JUNIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	1.0		
Political Economy		2.0	2.0
Composition *	1—0.4	1—0.4	1—0.4
German or French	2.0	2.0	2.0
Latin	3.0	3.0	3.0
Greek	3.0	3.0	3.0
Physics	3.0	3.0	3.0
Inorganic Chemistry	3.0	3.0	3.0
Drill	3—1.2	3—1.2	3—1.2
	16.6	17.6	17.6
Elective Studies.‡			
Analytic Geometry } Calculus } ‡	3.0	3.0	3.0
Literature	1.0	1.0	1.0
Public Speaking	1—0.4	1—0.4	1—0.4
Greek Testament	1.0	1.0	1.0
American Civil Government (Bryce)	1.0	1.0	1.0
French or German	2.0	2.0	2.0

SENIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Comparative Politics	2.0		
Psychology) ‡			
Logic) ‡	2.0	2.0	2.0
German or French	2.0	2.0	2.0
Latin	5.0	5.0	5.0
Greek	3.0	3.0	3.0
Sanitary Science	1.0	1.0	1.0
Chemical Laboratory	2—0.8	2—0.8	2—0.8
	15.8	13.8	13.8
Elective Studies. ‡			
Composition*	1—0.4	1—0.4	1—0.4
Public Speaking	1—0.4	1—0.4	1—0.4
History of Philosophy	1.0	1.0	1.0
Natural Theology	1.0	1.0	
Ethics	1.0	1.0	1.0
Literature	1.0	1.0	1.0
Spanish or Italian	2.0	2.0	2.0
Greek Testament	1.0	1.0	1.0
Astronomy) ‡			
Calculus) ‡	2.0	2.0	2.0
Mineralogy	2.0	2.0	2.0
Organic Chemistry	3.0	3.0	3.0
Geology	2.0	2.0	1.0
Biology	4.0	4.0	4.0
Physics	2.0	2.0	2.0
Elements of Law) ‡			
International Law) ‡	1.0	1.0	1.0
Drill	3—1.2	3—1.2	3—1.2

* Class room work. Theses written outside of recitation hours are required at stated periods.

† A course in Surveying and Leveling is given concurrently with plane trigonometry in the first term.

‡ For explanations regarding the choice of Elective Studies and number of recitation periods a week see "Elective Studies," page 16.

‡ Studies bracketed constitute a general subject, part of which cannot be taken to make up the number of recitation periods required.

II. Outline of the LATIN SCIENTIFIC COURSE.

FRESHMAN YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Rhetoric	2.0		
Composition*	1—0.4	1—0.4	1—0.4
Elocution	1—0.4	1—0.4	1—0.4
History of the English Language	1.0	1.0	
American Politics		1.0	3.0
Civil Government		1.0	
German or French	2.0	2.0	2.0
Latin	4.0	4.0	4.0
Algebra and Geometry	5.0	5.0	5.0
Physiology	3.0		
Botany		3.0	3.0
Drill	3—1.2	3—1.2	3—1.2
	19.0	19.0	19.0

SOPHOMORE YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	2.0	2.0	2.0
Literature	2.0	2.0	2.0
Composition*	1—0.4	1—0.4	1—0.4
Elocution	1—0.4	1—0.4	1—0.4
German or French	2.0	2.0	2.0
Latin	3.0	3.0	3.0
Trigonometry, Surveying and Analytic Geometry†	4.0	4.0	4.0
Inorganic Chemistry	3.0	3.0	3.0
Botany	2.0		
Zoölogy		2.0	2.0
Drill	3—1.2	3—1.2	3—1.2
	20.0	20.0	20.0

JUNIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	1.0		
Political Economy		2.0	2.0
Composition*	1—0.4	1—0.4	1—0.4
Organic Chemistry	3.0	3.0	3.0
Chemical Laboratory	2—0.8	2—0.8	2—0.8
Analytic Geometry and Calculus	3.0	3.0	3.0
Physics	3.0	3.0	3.0
Latin	3.0	3.0	3.0
German or French	2.0	2.0	2.0
Drill	3—1.2	3—1.2	3—1.2
	17.4	18.4	18.4
Elective Studies. ‡			
Literature	1.0	1.0	1.0
Public Speaking	1—0.4	1—0.4	1—0.4
Biology	2.0	2.0	2.0
German or French	2.0	2.0	2.0
American Civil Government (Bryce)	1.0	1.0	1.0

SENIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Comparative Politics	2.0		
Psychology, Logic ⁂	2.0	2.0	2.0
Sanitary Science	1.0	1.0	1.0
Geology	2.0	2.0	1.0
Mineralogy	2.0	2.0	2.0
German or French	2.0	2.0	2.0
Latin	5.0	5.0	5.0
	16.0	14.0	13.0
Elective Studies. ‡			
Literature	1.0	1.0	1.0
History of Philosophy	1.0	1.0	1.0
Natural Theology	1.0	1.0	
Ethics	1.0	1.0	1.0
Astronomy, Calculus ⁂	2.0	2.0	2.0
Spanish or Italian	2.0	2.0	2.0
Biology	4.0	4.0	4.0
German or French	2.0	2.0	2.0
Chemical Laboratory	2—0.8	2—0.8	2—0.8
Public Speaking	1—0.4	1—0.4	1—0.4
Composition*	1—0.4	1—0.4	1—0.4
Physics	2.0	2.0	2.0
Elements of Law, International Law ⁂	1.0	1.0	1.0
Drill	3—1.2	3—1.2	3—1.2

* † ‡ ⁂ See Corresponding foot-notes at end of Classical Course, page 19

III. Outline of the AGRICULTURAL COURSE.

FRESHMAN YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Rhetoric	2.0		
Civil Government		1.0	
Composition*	1=0.4	1=0.4	1=0.4
Elocution	1=0.4	1=0.4	1=0.4
History of English Language	1.0	1.0	
American Politics		1.0	3.0
German	2.0	2.0	2.0
Algebra and Geometry	5.0	5.0	5.0
Physiology	3.0		
Botany		3.0	3.0
Soils	2.0		
Agriculture		2.0	2.0
Shop Work	6=2.4	6=2.4	6=2.4
Military Drill	3=1.2	3=1.2	3=1.2
	19.4	19.4	19.4

SOPHOMORE YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	2.0	2.0	2.0
Literature	2.0	2.0	2.0
Composition*	1=0.4	1=0.4	1=0.4
Elocution	1=0.4	1=0.4	1=0.4
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Trigonometry, Surveying and Analytic Geometry†	4.0	4.0	4.0
Inorganic Chemistry	3.0	3.0	3.0
Botany	2.0		
Zoölogy		2.0	2.0
Agriculture	1.0	1.0	1.0
Military Drill	3=1.2	3=1.2	3=1.2
	20.0	20.0	20.0

JUNIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	1.0		
Political Economy		2.0	2.0
Composition*	1—0.4	1—0.4	1—0.4
Organic Chemistry	3.0	3.0	3.0
Chemical Laboratory	2—0.8	2—0.8	2—0.8
Physics	3.0	3.0	3.0
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Agriculture	5 0		
Animal Husbandry			4.0
Horticulture and Entomology		4.0	
Military Drill	3—1.2	3—1.2	3—1.2
	18.4	18.4	18.4
Elective Studies.‡			
Literature	1.0	1.0	1.0
Public Speaking	1—0.4	1—0.4	1—0.4
Biology	2.0	2.0	2.0
Analytic Geometry and Calculus	3.0	3.0	3.0
American Civil Government (Bryce)	1.0	1.0	1.0

SENIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Comparative Politics	2.0		
Psychology		2.0	1.0
Logic			2.0
Sanitary Science	1.0	1.0	1.0
Geology	2.0	2.0	1.0
Mineralogy	2.0	2.0	2.0
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Agriculture	4.0		4.0
Veterinary Science		4.0	
Plant Diseases		3.0	
	15.0	18.0	14.0

‡ *All elective studies offered in the Senior Year of the Latin Scientific Course* (*see page 21,*) *are open to students in this Course.*

* † ‡ See corresponding foot-notes at end of Classical Course, page 19.

IV. Outline of GENERAL SCIENCE COURSE.

FRESHMAN YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Rhetoric	2.0		
Composition*	1—0.4	1—0.4	1—0.4
Elocution	1—0.4	1—0.4	1—0.4
History of English Language	1.0	1.0	
American Politics		1.0	3.0
Civil Government		1.0	
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Algebra and Geometry	5.0	5.0	5.0
Physiology	3.0		
Botany		3.0	3.0
Military Drill	3—1.2	3—1.2	3—1.2
Shop-work or Drawing	6—2.4	6—2.4	6—2.4
	19.4	19.4	19.4

SOPHOMORE YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	2.0	2.0	2.0
Literature	2.0	2.0	2.0
Composition*	1—0.4	1—0.4	1—0.4
Elocution	1—0.4	1—0.4	1—0.4
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Trigonometry, Surveying and Analytic Geometry†	4.0	4.0	4.0
Inorganic Chemistry	3.0	3.0	3.0
Botany	2.0		
Zoölogy		2.0	2.0
Military Drill	3—1.2	3—1.2	3—1.2
	19.0	19.0	19.0

JUNIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
History	1.0		
Political Economy		2.0	2.0
Composition*	1—0.4	1—0.4	1—0.4
Organic Chemistry	3.0	3.0	3.0
Chemical Laboratory	2—0.8	2—0.8	2—0.8
Analytic Geometry and Calculus	3.0	3.0	3.0
Physics	3.0	3.0	3.0
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Military Drill	3—1.2	3—1.2	3—1.2
	16.4	17.4	17.4
Elective Studies.‡			
Literature	1.0	1.0	1.0
Public Speaking	1—0.4	1—0.4	1—0.4
Biology	2.0	2.0	2.0
American Civil Government (Bryce)	1.0	1.0	1.0

SENIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Comparative Politics	2.0		
Psychology } ½	2.0	2.0	2.0
Logic }			
Sanitary Science	1.0	1.0	1.0
Geology	2.0	2.0	1.0
Mineralogy	2.0	2.0	2.0
German or French	2.0	2.0	2.0
	11.0	9.0	8.0
Elective Studies. ‡			
Literature	1.0	1.0	1.0
American Civil Government (Bryce)	1.0	1.0	1.0
History of Philosophy	1.0	1 0	1.0
Natural Theology	1.0	1.0	
Ethics	1.0	1.0	1.0
Astronomy } ½	2.0	2.0	2.0
Calculus }			
Spanish or Italian	2.0	2.0	2.0
Biology	4.0	4.0	4.0
German or French	2.0	2.0	2.0
Chemical Laboratory	2—0.8	2—0.8	2—0.8
Physics	2.0	2.0	2.0
Public Speaking	1—0.4	1—0.4	1—0.4
Composition*	1—0.4	1—0.4	1—0.4
Drill	3—1.2	3—1.2	3—1.2

*, †, ‡, ½. See corresponding footnotes at end of Classical Course, page 19.

V. Outline of Course in CIVIL ENGINEERING.

Notes.

A full description of the Course may be found under the heading Methods of Instruction. Opportunity is offered for election of a portion of the work in the second and third terms of the Senior year. Each student must elect, in each of these terms, one of the recommended technical elective studies or a technical equivalent.

FRESHMAN YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Rhetoric	2.0		
History of the English Language	1.0	1.0	
English Composition*	1—0.4	1—0.4	1—0.4
Elocution	1—0.4	1—0.4	1—0.4
American Politics		1.0	3.0
Civil Government		1.0	
German or French	2.0	2.0	2.0
Algebra and Geometry	5.0	5.0	5.0
Steam Engines and Steam Boilers	2.0	2.0	2.0
Mechanical Drawing	6—2.4	6—2.4	6—2.4
Shop-work	6—2.4	6—2.4	6—2.4
Military Science and Tactics	3—1.2	3—1.2	3—1.2
	18.8	18.8	18.8

SOPHOMORE YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition*	2—0.8	2—0.8	2—0.8
Elocution	1—0.4	1—0.4	1—0.4
German or French	2.0	2.0	2.0
Trigonometry and Analytic Geometry	3.0	4.0	4.0
Mechanics	3.0	3.0	3.0
Inorganic Chemistry	3.0	3.0	3.0
Surveying	3.0	2.0	2.0
Descriptive Geometry	2—0.8	2—0.8	2—0.8
Mechanical Drawing	3—1.2	3—1.2	3—1.2
Field-work in Surveying	3—1.2		3—1.2
Plotting		3—1.2	
Military Science and Tactics	3—1.2	3—1.2	3—1.2
	19.6	19.6	19.6

* See foot-note, page 19.

JUNIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Elocution	1—0.4	1—0.4	1—0.4
German or French	2.0	2.0	2.0
Analytic Geometry and Calculus	3.0	3.0	3.0
Mechanics of Solids	3.0	3.0	3.0
Physics	3.0	3.0	3.0
Chemical Laboratory	2—0.8	2—0.8	2—0.8
Mineralogy	2 0	2.0	2.0
Surveying	2.0	2.0	2.0
Free-hand and Mechanical Drawing	3—1.2	3—1.2	3—1.2
Field-work in Surveying	3—1.2		3—1.2
Topographical Drawing		3—1.2	
Military Science and Tactics	3—1.2	3—1.2	3—1.2
	19.8	19.8	19.8

SENIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Elocution	1—0.4	1—0.4	1—0.4
Calculus	2.0		
Hydromechanics		3.0	3.0
Geology	2.0	2.0	1.0
Sanitary Science	1.0	1.0	1.0
Mechanics of Materials	3.0	4.0	
Railroad Engineering	3.0		
Highways			2.0
Roofs and Bridges	2.0 / 3—1.2	2.0 / 3—1.2	
Building Construction	2.0		
Masonry Construction		1.0	3.0
Contracts and Specifications			3.0
Thesis	2—0.8	2—0.8	
Drawing	2—0.8	2—0.8	2—0.8
Field-work in Surveying	4—1.6		
Engineering Laboratory		4—1.6	
Field-work or Laboratory			3—1.2
	19.8	17.8	15.4
Elective Studies.			
Railroad Engineering		2.0	4.0
Applied Electricity			5.0
Bridge Engineering		2.0	4.0
Materials of Construction		2.0	4.0
Building Construction		2.0	4.0
Water Supply		2.0	4.0
Sewerage		2.0	4.0
Hydraulics		2.0	4.0
Pumps and Hydraulic Motors			3.0

VI. and VII. Outline of COURSES IN MECHANICAL AND ELECTRICAL ENGINEERING.

Opportunity is offered for election in a portion of the work in the Senior year. A full description of the Course of Study will be found under the proper head.

FRESHMAN YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Elocution	1—0.4	1—0.4	1—0.4
Composition*	1—0.4	1—0.4	1—0.4
Rhetoric	2.0		
History of English Language	1.0	1.0	
American Politics		1.0	3.0
Civil Government		1.0	
German or French	2.0	2.0	2.0
Algebra and Geometry	5.0	5.0	5.0
Steam Engines and Boilers	2.0	2.0	2.0
Mechanical Drawing	6—2.4	6—2.4	6—2.4
Shop-work	6—2.4	6—2.4	6—2.4
Military Science and Tactics	3—1.2	3—1.2	3—1.2
	18.8	18.8	18.8

SOPHOMORE YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Elocution	1—0.4	1—0.4	1—0.4
English Composition*	2—0.8	2—0.8	2—0.8
German or French	2.0	2.0	2.0
Inorganic Chemistry	3.0	3.0	3.0
Trigonometry and Analytic Geometry	3.0	4.0	4.0
Surveying	3.0	2.0	2.0
Surveying, Field-work and Plotting	3—1.2	3—1.2	3—1.2
Elementary Mechanics	3.0	3.0	3.0
Mechanical Drawing	3—1.2	3—1.2	3—1.2
Shop-work	3—1.2	3—1.2	3—1.2
Military Science and Tactics	3—1.2	3—1.2	3—1.2
	20.0	20.0	20.0

* See foot-note, page 19.

JUNIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Elocution and Public Speaking	1—0.4	1—0.4	1—0.4
German or French	2.0	2.0	2.0
Chemical Laboratory	2—0.8	2—0.8	
Analytic Geometry and Calculus	3.0	3.0	3.0
Physics	3.0	3.0	3.0
Mechanics of Solids	3.0	3.0	3.0
Kinematics	3.0	3.0	
Graphical Statics			3.0
Valve Gears	2.0	2.0	
Electricity			3.0
Drawing	3—1.2	3—1.2	3—1.2
Shop-work	3—1.2	3—1.2	3—1.2
Military Science and Tactics	3—1.2	3—1.2	3—1.2
	20.8	20.8	21.0

MECHANICAL ENGINEERING.

SENIOR YEAR.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Elocution and Public Speaking	1—0.4	1—0.4	1—0.4
Calculus	2.0		
Roofs and Bridges	3.0		
Hydromechanics		3.0	3.0
Mechanics of Materials	3.0	3.0	
Specifications and Contracts			3.0
Thermodynamics	4.0		
Steam Engine Design	3.0	3.0	
Machine Design	3—2.0	3—2.0	3—2.0
Steam Boilers		3.0	3.0
Pumps and Hydraulics Motors			3.0
Transmission of Power			2.0
Thesis		3—1.2	
Shopwork and Mechanical Laboratory	6—2.4	6—2.4	6—2.4
	19.8	18.0	18.8
Elective Studies.			
Military Science and Tactics	3—1.2	3—1.2	3—1.2
Railroads	3.0		
Bridges		4.0	4.0
Building Construction	2.0	2.0	2.0
Water Supply			4.0
Astronomy		2.0	2.0

ELECTRICAL ENGINEERING.

SENIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Elocution and Public Speaking	1=0.4	1=0.4	1=0.4
Calculus	2.0		
Hydromechanics		3.0	3.0
Specifications and Contracts			3.0
Thermodynamics	4.0		
Steam Engine Design	3.0		
Machine Design	3=2.0	3=2.0	3=2.0
Steam Boilers		3.0	
Pumps and Hydraulic Motors			3.0
Electrical Measurements	1.0	2.0	
Electrical Machinery	4.0	3.0	
Applied Electricity			5.0
Thesis		3=1.2	
Mechanical and Electrical Laboratory	6=2.4	6=2.4	6=2.4
	18.8	17.0	18.8
Elective Studies.			
Military Science and Tactics	3=1.2	3=1.2	3=1.2
Railroads	3.0		
Boilers			3.0
Transmission of Power			2.0
Roofs and Bridges	3.0		
Mechanics of Materials	3.0	3.0	

Shorter Course in AGRICULTURE.

First Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
Rhetoric	2.0		
Composition*	1—0.4	1—0.4	1—0.4
American Politics		1.0	3.0
Civics		1.0	
Inorganic Chemistry	3.0	3.0	3.0
Physiology	3.0		
Zoölogy	3.0		
Botany		2.0	2.0
Entomology		4.0	
Farm Crops and Soils		4.0	
Stock Breeding			4.0
Breeds of Live Stock			3.0
Farm Economy, Farm Appliances and Machinery	4.0		
Algebra and Geometry	5.0	5.0	5.0

Second Year.

Subjects.	Periods per Week. 1st Term.	2d Term.	3d Term.
English Literature	2.0	2.0	2.0
Composition*	1—0.4	1—0.4	1—0.4
Organic Chemistry	3.0	3.0	3.0
Sanitary Science	1.0	1.0	1.0
Botany	4.0		
Manures and Fertilizers and their Use	4.0		
Stock Feeding and Dairying	2.0		
Plant Diseases		2.0	2.0
Horticulture		4.0	
Veterinary Science		3.0	3.0
The Composition and Structure of Plants			3.0

Note.—Shop-work throughout at least one year.

*See foot-note, page 19.

METHODS OF INSTRUCTION.

English Language and Literature.

The studies in this department include Rhetoric, Composition, the History of the English Tongue, and Literature.

The study of Rhetoric and of the History of the English Tongue are begun in the first term of the Freshman year. The former is completed in that term, while the latter occupies two terms. Along with the study of Rhetoric and after it has been finished, there is special class instruction in the art of Composition, and throughout the entire course written themes are frequently required.

American Literature is taken up in the first term of the Sophomore year, and English Literature somewhat later in the same term.

Literature is a required study to the end of the Sophomore year only, and is optional thereafter throughout the remainder of the course. The object aimed at during the required course in American and English Literature is to cultivate a taste for the best reading rather than to cumber the memory with names, dates and mere biographical details concerning the masters of literature.

A considerable amount of reading is required during this part of the course, and the lectures are made short in order that there shall be time for reading and discussion in class.

The optional course in literature is devoted to the study of the great masters and of the history and philosophy of literature.

A library chosen especially with a view to the needs of students in literature is an important adjunct to the study, or perhaps it would be more nearly true to say that the class room is made an adjunct and introduction to the library.

Political Science.

The effort has been made to provide a consistent and well-developed course in Political Science, including History, Civil Government, Political Economy, and Comparative Politics.

ARTILLERY SECTION.

The study of American Politics is introduced in the second term of the Freshman year, and here the intent is that as far as possible the lectures shall be subordinated to special investigations to be made by the students themselves.

The library is the workshop of students in this branch, and many books bearing especially upon this subject have recently been provided.

Along with the subject of American Politics comes the study of Civil Government in the United States, and the general subject is continued throughout the Sophomore year in historical studies. There is an optional advanced course in American Civil Government provided in the Junior year.

These in turn lead to Political Economy and Comparative Politics.

PSYCHOLOGY, ETHICS, LOGIC AND LAW.

Psychology is a required study of the Senior year. A text book is used, and the object is to give the student as clear a conception of modern physiological psychology as can be obtained without the apparatus of a psychological laboratory, and at the same time to call attention to the earlier psychological system, as taught for example, in the works of Sir William Hamilton. The general library of the College has a small, but excellent division of psychology, representing the earlier and later schools.

The study of ethics is elective in the Senior year, and to such as pursue it recitations are given once a week during the three terms. Its relations to phychology and civil government are pointed out and emphasized. Books of reference are cited and students are encouraged to read works bearing upon the subject.

Lectures on the elements of law are given to such of the Senior class as desire it, and for the members of the Senior class in civil engineering there is a special course of lectures on the law of contracts.

The study of International Law is elective in the Senior year. To such as take it the present status of the law is briefly, but clearly explained.

The study of logic is required of all the students in the Senior class except those who are in the engineering courses. A text book is used and examples and illustrations are freely given

to test the knowledge of the class. The aim is to make the subject useful both in its practical application and as a discipline for the mind.

ELOCUTION AND ALLIED STUDIES.

The object is to make elocution not merely an exercise in vocal gymnastics, but a study related on the one side to literature, on the other to politics. To this end the student is impressed with the idea that no cleverness in mere dramatic elocution can make up for poverty of thought or deficiency in critical insight.

Instruction is given to the freshmen in the principles of reading, articulation, pronunciation, emphasis and expression. Care is taken to eradicate, as far as possible, natural defects, to correct bad habits and to induce an easy and agreeable utterance. The members of the class are taught to look carefully for the meaning of words, sentences and paragraphs, and to bear constantly in mind the subject considered. During the third term of the Freshman year the class is required to read some portion of the English classics.

In the Sophomore year reading is continued during the first term and practice given in declamation; short selections are memorized. During the second and third terms attention is given to voice culture and gesticulation.

The members of the Junior class are instructed in the reading and recitation of original essays and orations.

Original orations are required of the Senior class, and debates on some of the leading questions of the day, and practice given in parliamentary law. The class is taught the logical order of conducting a debate, and criticisms are made in regard to both matter and manner.

Individual instruction is, also, given to the members of the Sophomore, Junior and Senior classes.

MODERN LANGUAGES AND LITERATURES.

French and German are among the required subjects of study, and Spanish and Italian are offered to such as wish to elect them. Each student must study the modern languages at least three years. One language (German or French) may be taken three

years; or one language two years, and the other language one year. In some courses, as much as ten years of modern languages may be taken.

The work is so conducted as to give all an opportunity to learn to read the modern languages readily; to understand them when heard; to write them correctly, and so to be able to learn easily to speak them, if necessity arises; but the main object is to inspire such a love for the literatures and languages, as will be a source of pleasure and of intellectual growth. Lectures are occasionally given in English, French or German. Books are being collected, and advanced methods of work are being adopted, as fast as the time at command and the resources of the library will permit.

The publications of the Société des Anciens Textes Français, Godefroy's Old French Dictionary, Romania, Zeitschrift für Romanische Philologie, Beiträge zur Geschichte der Deutschen Sprache und Literatur, Goethe-Jahrbuch, The Journal of Germanic Philology, Modern Language Notes and other helps are now in the library. The work in Old German and Old French especially will be made to throw light on the English language and literature, as indeed all the work in the modern languages is intended to do.

The following courses will be offered in 1899-1900.

FRENCH.

1. Beginning French. Grammar (Whitney.) Easy reading in modern French. Twice a week.
2. The Romantic School. Crane's Romantisme Français. Hugo's Hernani. Grammar continued. Twice a week.
3. The French Classics. Molière, Corneille, Racine. Course conducted largely in French. Writing French. Twice a week.
4. History of French Literature, with readings in Montaigne, Rabelais, etc. Course conducted chiefly in French. Old French (Aucassin and Nicolette.) Twice a week.

SPANISH.

5* Grammar (Manning.) Easy reading in modern Spanish. Twice a week.

*It is not certain that both of these Courses can be given in 1899-1900.

ITALIAN.

6* Grammar (Manning.) Easy reading in modern Italian. Twice a week.

GERMAN.

1. Beginning German. Grammar (Joynes-Meissner.) Easy reading in modern German. Twice a week.
2. Schiller's Jungfrau von Orleans. Lessing's Minna von Barnhelm. Goethe's Hermann und Dorothea. Grammar continued. Twice a week.
3. Goethe's Faust (Parts I. and II.) Course conducted largely in German. Writing German. Twice a week.
4. History of the German Literature. Course conducted chiefly in German. Selections from Middle High German writers. Twice a week.

LATIN AND GREEK.

COURSES OF STUDY AND METHODS OF INSTRUCTION.

FRESHMAN YEAR.

LATIN.—Nepos, De Viris Inlustribus. Vergil, Books IV-VI. Four hours a week throughout the year.

GREEK.—Xenophon, Anabasis Books III-IV. Homer, Iliad Books I-III. Four hours a week throughout the year.

SOPHOMORE YEAR.

LATIN.—Cicero, 5 Orations. Ovid, Metamorphoses, 2500 verses, Prose composition. Three hours a week throughout the year.

GREEK.—Xenophon, Memorabilia. Homer, Odyssey. Herodotus, Book VIII. Four hours a week throughout the year.

JUNIOR YEAR.

LATIN.—Livy, 21st or 22d book. Horace, Odes, Satires, Epistles. Prose composition. Three hours a week throughout the year.

GREEK.—Plato, Phaedo. Thucydides, Book I. Demosthenes, 3rd Olynthiac. Three hours a week throughout the year.

ELECTIVE.—Greek Testament, one hour a week throughout the year.

*See foot-note page 35.

SENIOR YEAR.

LATIN.—Tacitus, Germania and Agricola. Juvenal, Satires. Plautus, or Terence, Comedies. Collateral reading. Five hours a week.

GREEK.—Aeschylus, Prometheus Bound. Arrian, Anabasis of Alexander, Lucian, Timon. Collateral reading. Three hours a week throughout the year.

ELECTIVE.—Greek Testament, one hour a week throughout the year.

LATIN LANGUAGE AND LITERATURE.

Much of the training in the Freshman year is devoted to acquiring an extended vocabulary, familiarity with the Latin order of thought and syntax. Throughout the course the aim is to enable the student to acquire facility and quickness in reading at sight. Word-meaning is fixed by inspecting form, derivation, and comparing with synonymes. While the work of the first three years is limited at present to the study of authors of the Ciceroni-Augustan age, the work of the Senior year may be changed from time to time to embrace not only the leading authors of the Silver age but also the chief representatives of Early and Late Latin, thus giving the student a comprehensive scope of Latin literature. The public and private life of the Romans and their influence on modern literature and civilization are continually kept before the minds of the students. The Roman method of pronunciation is used.

GREEK LANGUAGE AND LITERATURE.

The authors in Greek are selected with a view to their representative character. The aim is to give the student some familiarity with the Greek epic, tragedy and comedy; with the historians, philosophers and orators. The student's attention is called to the differences in style of the authors and to dialectic peculiarities. Collateral reading in Latin and Greek is required in the Senior year. New Testament Greek is offered as an elective in Junior and Senior years. In both departments the general principles of comparative philology are explained and applied and an effort is made to create in the student an impulse to pursue more thoroughly these subjects in a university and to prepare him to enter upon such courses with success and pleasure.

MATHEMATICS.

The course in pure Mathematics includes instruction in advanced algebra, geometry, plane and spherical trigonometry, analytic geometry and the calculus. In the Classical course mathematical studies are elective after the Sophomore year. In all other courses except the several engineering courses the student may end his mathematical work upon the completion of the Junior year. In the engineering courses pure mathematical studies are required to the end of the first term of the Senior year. Provisions are made for students who may desire to pursue mathematical studies beyond the course as laid down in the curriculum.

Freshman Year.—A short general review of elementary algebra and plane geometry is given, but the main part of the time is occupied with the completion of algebra beyond what is required for admission and with solid geometry and the mensuration of solids.

Sophomore Year.—Plane Trigonometry is studied in the first term, and concurrently with this subject is given a thoroughly practical course in Surveying and Leveling to such students as are not in any of the engineering courses. The periods thus taken from the time allotted to mathematical work are employed by the engineering departments to make their courses fuller and richer in the application of mathematics to engineering subjects. The practical bearing given to the mathematical instruction of the first term of the Sophomore year not only equips the student for greater possible future usefulness, but serves to enhance the disciplinary value of the study of mathematics through the added interest and zest of applying results and methods to the solution of problems of actual experience. In the second term spherical trigonometry is completed, and attention is given to the discussion and solution of simple astronomical questions. Analytic geometry is then taken up and continued the rest of the year.

Junior Year.—The course in analytic geometry is completed and the rest of the year is devoted to the study of the differential and integral calculus.

Senior Year.—Throughout the first term of the Senior year an advanced course in the applications of the calculus is pursued. In the second and third terms of the Senior year instruction is given in astronomy, Young's General Astronomy being the text-book used.

Students who may wish to pursue advanced mathematical studies will have opportunities of receiving instruction in the Method of Least Squares, Differential Equations, Theory of Functions, etc. Instruction in these subjects will be given by means of lectures, recitations, and reading of standard authors in the class-room.

The department library contains a fine collection of standard treatises covering all lines of mathematical inquiry. Many of the leading mathematical journals are regularly received. Advanced students are encouraged to make use of the library.

PHYSICS.

Physics forms a part of the required work of all of the regular courses of study. Three hours a week throughout the Junior year are given to this subject. The study of Physics teaches certain intellectual methods, certain modes of exact thought, which are not required by other sciences in their elementary stages. Instruction is given by means of text-book recitations, lectures and demonstrations. Provision is made for laboratory exercises requiring accurate observation and measurement. In the arrangement of the work in physics the wants of those who are pursuing the study as part of their preparation for other sciences, in particular medicine and engineering, as well as of those who simply take physics as an indispensable part of a course of liberal education, are carefully considered. The demonstrations employed to explain the text and to illustrate the lectures are of necessity largely qualitative in character, but all students are given quantitative exercises. Such exercises furnish valuable training in habits of close observation and exact thinking. The physical department possesses an excellent equipment of modern apparatus for class-room demonstrations and laboratory work. The course in physics is so correlated with the work of the engineering courses and other departments of applied science as to make most effective the several lines of physical instruction offered by the college. The library of the department contains many of the best text-books and books of reference in English, German and French. Books of a popular character are put into the general library. Students are referred to the library for fuller information upon topics discussed in the text-book and lectures, and the habit of

reading scientific journals is constantly encouraged. Books are continually added to the library so that it is kept thoroughly up-to-date. The journal list is large and includes the leading English, French and German journals of physics and allied sciences. The library is open to the students at all times during the working hours of the college.

An Elective Course of two hours a week, or their equivalent in laboratory periods, throughout the Senior year is open to all students. Much of this time will be given to laboratory exercises. This course will be specially useful to students who are not in any of the engineering courses, but who desire to familiarize themselves with the methods employed in physical investigation. Apart from its value as contributing to a liberal education through the treatment of modern methods of physical research it provides valuable training for scientific inquiry and professional application.

CHEMISTRY, MINERALOGY, GEOLOGY AND SANITARY SCIENCE.

Chemistry.—Instruction is given in Pure and Applied Chemistry by lectures, recitations, and laboratory practice. This course extends through the Sophomore, the Junior, and the Senior year, and embraces the elements of Inorganic and Organic Chemistry. Students, after making themselves familiar with the details of experiments, are required to repeat the same in the laboratory.

The chemical laboratory is open daily for instruction in analytical chemistry.

The course of instruction in qualitative analysis will include the examination of simple and complex substances in the wet way, their analysis by the use of the blow-pipe and flame reactions, and the determination of minerals with the blow-pipe.

Students are required to keep a careful record of their work, and to submit the same to the inspection of the professor. Upon passing satisfactory examination in qualitative analysis, students may, if they so desire, take up quantitative analysis.

The course of instruction in quantitative analysis will embrace the gravimetric analysis of simple and complex salts, minerals, ashes of plants, fertilizers, waters, etc.; volumetric analysis, in-

CORNER OF CHEMICAL LABORATORY.

cluding acidimetry, alkalimetry, chlorimetry, etc.; organic analysis; gas analysis and the preparation of inorganic and organic compounds.

Students desiring to take a post-graduate course will find excellent opportunities for pursuing their studies.

In order to make the instruction thoroughly practical, lectures upon the leading chemical and metallurgical industries will be given throughout the entire course. During the sessions visits will be made to some of the great manufacturing establishments in which chemical and metallurgical operations are carried on. Students will thus have most valuable opportunities of gaining a practical acquaintance with some important branches of applied science.

The library of the department is well supplied with the standard works of reference, and the leading American and foreign journals are on file and at all times accessible to the students.

Assaying.—The assay laboratory is kept in full working order, completely furnished with crucible, scorification and cupelling furnaces, and everything for practical work in the assay of ores of lead, silver, gold, etc. The general principles as well as special methods of assaying are explained in the lecture room, and at the same time ores of the various metals are exhibited and described. From a collection of these ores from various parts of the country, the students are required to make a number of assays under the immediate supervision of the professor.

Mineralogy.—The course of instruction in Mineralogy extends throughout the Junior year. The first term is usually occupied with the discussion of the *physical properties* of minerals, including their morphological properties (Crystallography), their optical properties, hardness, specific gravity, etc. The second and the third terms are devoted to Descriptive Mineralogy. Students also receive practical instruction in Determinative Mineralogy.

Geology.—The work in this department comprises recitations and lectures upon General Geology throughout three terms of the Senior year. The student is first taught the principles of Lithology and of Microscopic Petrography. For this work the College has provided itself with the best petrographical microscopes and sets of hand specimens and thin sections of the typical rocks. The study of Structural and Dynamical Geology occupies

the second and third terms of the Senior year, when the student is taught the arrangement of rock masses, and the agencies concerned in their upheaval, erosion and metamorphism.

Sanitary Science.—The instruction in this important study is thoroughly practical, and embraces recitations and lectures on the following subjects: Water, Air, and Food; Disposal and Utilization of Sewage; Origin and Spread of Epidemics; Disinfectants and their uses; Ventilation and Warming; Vital Statistics, etc.

BIOLOGY.

The aim of biological instruction is to give the student some knowledge of the various living things by which he is surrounded and the relation which man bears to them economically, biologically and morally, as well as to develop habits of careful observation and comparison, and close and accurate methods of thinking.

Most of the time is spent in actual study in the laboratory, which is supplied with tables, microscopes and re-agents, as well as with illustrative specimens and charts.

Material for dissection is supplied by the college, although the students are encouraged to collect as much as possible. The required work in biology is finished with the Sophomore year, but to provide for the continuation of the work by those who desire to pursue its study further, elective work is offered in the Junior and Senior years.

Those students who expect to become farmers, physicians or naturalists, or who have a decided liking for Natural History studies, will thus have opportunity to continue their work in a line directly in accord with their tastes and future occupation in life and, at the same time, obtain the mental drill which is the chief object of a college training.

Elective work in either Botany or Zoölogy may be arranged to suit the taste, capacity and fitness of the student desiring it, and will consist mostly of laboratory work in Phænogamic Botany and Vertebrate Zoölogy.

Human Anatomy and Physiology.—Martin's "The Human Body, Briefer Course," is used as a text-book for this study during the first term of the Freshman year.

It is expected that, in this way, a student will become acquainted with the more important facts connected with the structure of the body, the form and uses of the various organs and the Hygiene of the body.

Illustrative material, consisting of fresh or preserved specimens, skeletons and charts, is used whenever practicable.

Botany.—Beginning with the second term of the Freshman year, the study of Botany is continued one year. In the first term most of the time is spent on the gross and microscopic structure of the higher plants. During the second term, when abundance of fresh material can be had, the structure and relationships of flowering plants are studied by means of specimens, of which written descriptions are required.

Some work with an analytical key is required, so that a student may become familiar with its use and gain a clear conception of the relations of plants to each other and their classification into species, genera and larger groups.

In the third term the study of flowering plants is finished and several typical specimens of cryptogams studied so that the students may know something of the life histories of these lower forms of plants.

A set of about 130 wall charts, a large number of mounted microscopic specimens and a herbarium, provide plenty of material for illustrating the various subjects as they come up for study.

A library of the more important reference works is kept in the laboratory and students are encouraged to use it.

The larger part of the time given to the study of Botany is spent in the laboratory, but this work is supplemented by the use of a text-book and some recitations or lectures.

Zoölogy.—During the last two terms of the Sophomore year Zoölogy takes the place of Botany. As in the latter study, most of the time is devoted to laboratory work.

Selected types of the various classes of animals are dissected, and in this way the student becomes acquainted with animal structure by studying animals themselves, and the development of the faculties of observation and comparison is continued.

Invertebrate types are considered during the first term, and vertebrate forms in the second term.

Written records of work accomplished, illustrated by drawings are required of each student.

The laboratory is supplied with a collection of charts illustrating the invertebrates, and a set of mounted skeletons showing the variations in vertebrate forms. There is also a supply of disarticulated skeletons for use in class and compound microscopes in sufficient number so that each student has the use of one.

A collection of marine invertebrates obtained from the U. S. National Museum and other specimens of various kinds assist in giving some idea of the great variety of animal forms.

AGRICULTURE.

The object of the course in this department is to fit young men, who have a taste for science and agriculture, understandingly to manage farms or to become workers in Experiment Stations or in other situations where there is necessary a knowledge of the sciences in their application to agriculture.

Only the broadly trained man can become a successful specialist; therefore it will be seen by reference to the detailed schedule of the Course on page 31, that it includes a certain amount of study in English, Economics, History, Mathematics and Language; subjects which by common consent are embraced in the training and equipment of every well educated man.

In order that the student may get the most good from his technical studies, most of that work is done in the last two years of the course after a good foundation has been laid by the study of the Natural Sciences, the application of which to practice, constitutes Agricultural Science.

For description of courses and methods of instruction in branches common to other courses, see the appropriate headings.

FRESHMAN YEAR.

In this year the course differs very little from the Latin-Scientific except in substituting for the study of Latin, some agricultural and mechanical work.

Soils.—The first technical subject is the Soil; its origin, chemical and mechanical composition, nature and texture; its relations to air, water, heat and plants; the means for increasing and preserving its fertility; the effects of tillage, drainage and fertilizers.

Animal Husbandry.—During the winter term the study of the breeds of live stock is taken up.

The origin, history, characteristics and adaptability to different localities and styles of farming of the different varieties of cattle, horses, sheep and swine.

Shop Work.—This course is designed to give the student a knowledge of the care and use of wood-working tools and some skill in making simple joints, splices, mortises, frames, etc.

Work in wood-turning and in iron and steel forging is, also, included.

SOPHOMORE YEAR.

Farm Crops.—Much of the time devoted to agriculture in this year is given to the study of the history, uses, production, adaptability to soil and climate, and methods of cultivation, of the more important farm crops of the country.

Dairying.—A course of lectures on the handling and care of milk and its products is given in the winter term. This includes work in the determination of fat in milk by the Babcock tester, and special attention to the commercial handling of milk.

JUNIOR YEAR.

Fertilizers and Manures.—The various kinds of fertilizing materials are studied with reference to their sources, composition, manner of use and adaptability to different soils and crops; their effect upon the land and the product and the economy of their use; the proper methods for preserving the manurial substances of the farm and the principles underlying the home mixing of fertilizers.

Horticulture and Entomology.—A course of instruction in these subjects is given in the winter term, the details of which are set forth on page 49.

It will be seen that the technical work of this year is based upon previous study of Chemistry, Botany and Zoölogy. Work in at least two of these sciences is also carried on during the year in continuation of work begun in preceding years.

SENIOR YEAR.

Stock Feeding.—The theory and practice of feeding farm animals, including the composition and preparation of foods; the compounding of rations; the adaptability of different foods to the various kinds of animals, according to the results expected in feeding them, whether the production of milk, butter, meat, wool, eggs or labor.

Stock Breeding.—A thorough study of the principles of breeding farm animals, including the methods by which the live stock of the farm may be improved and made more productive, and, thereby, more profitable.

Veterinary Science.—Lectures on the anatomy and physiology of the domestic animals; the most common of the diseases to which they are subject, with methods of treatment; special attention is given to the consideration of means for preventing disease and keeping animals in health.

Plant Diseases.—During the winter a course of lectures is given which is intended to familiarize the student with the appearance of the various diseases to which plants are subject, the manner in which they cause damage and the methods of preventing them.

History of Agriculture.—Lectures and recitations upon the history of agriculture in general and especially upon its development in our own country are provided.

WINTER COURSE IN AGRICULTURE.

For the benefit of those young men who desire to become better farmers, and who feel that they cannot take our full four years course in agriculture, a short course has been arranged, coincident with the winter term of the College, beginning the first Tuesday in January and closing on the last Friday in March.

The work in this course is arranged as follows, instruction being given by such methods as seem best adapted to the subject taught, and including lectures, laboratory work and study of text books or other literature:

Agricultural Chemistry—24 Lectures.

A study of the substances entering into the composition of plants, including descriptions of the elements and their compounds, the general laws of chemical combinations and the uses of these substances in plants.

Commercial Fertilizers.—Consideration of the ingredients used in the manufacture of fertilizers, their sources and composition, adaptability to different plants and soils. Methods and economy of their use, including home mixing and use of special fertilizers.

General Agriculture—12 Hours.

The Soil.—Its origin and composition; its relation to air, heat and water; its physical and chemical properties. The effect of drainage, of cultivation and tillage and the relation of crops and manures to the soil; the benefits from rotation of crops.

Farm Crops.—The history, production and uses of the different staple crops of the farm, as Wheat, Corn, Potatoes, etc., including the selection, preparation and general management of the soil, methods of cultivation and harvesting.

Farm Manures.—The preservation, composition and utilization of the various manurial substances found on the farm.

Animal Industry—2 Hours Per Week.

Study of the various *breeds* of horses, cattle, sheep and swine, their history, characteristics and adaptability to different kinds of farming.

The *principles of breeding*, as applied to pure bloods and to grades.

The *feeding of farm animals*, including study of the composition and digestibility of the various grains and fodders, their adaptability to different uses and the economy of their use.

Practice in the construction of rations for farm animals.

Dairying and Creamery Work—12 Lectures.

The chemistry of milk in general.
Treatment of milk.
Creamery machines and methods.
Testing of milk.
The commercial side of the dairy.

Veterinary Science and Practice—4 Hours Per Week.

A study of the anatomy, physiology and pathology of the domestic animals, with the actions and uses of medicines; careful study of the preventive treatment of diseases.

Instruction in the methods of determining the age of animals.

Veterinary surgery, dealing especially with emergency cases.

Hygiene of domestic animals.

Plant Diseases—2 Hours Per Week.

The lectures on this subject will treat of,—

1. The normal plant, and the conditions of healthy develop-

ment; how to preserve these conditions and thus render plants more resistant to disease.

2. Fungi, their general character and relation to plant diseases.

3. The spread of plant diseases and hygienic measures looking towards their suppression. Legislation against plant diseases.

4. Preventive treatment of plant diseases. Fungicides, their preparation and application.

5. Special consideration of plant diseases. *a*. Diseases affecting the larger fruits. *b*. Diseases affecting small fruits. *c*. Diseases affecting shade trees, ornamental plants and flowers. *d*. Diseases of vegetables. *e*. Diseases of cereal and forage crops.

AGRICULTURAL BACTERIOLOGY—1 HOUR PER WEEK.

These lectures will treat of:—

1. The general characters, and methods of study of bacteria and their relations to health and disease.

2. Methods of destroying bacteria; antiseptics and disinfectants.

3. Bacteria of the soil; their general relation to soil fertility; nitrification; nitrogen assimilation; the special use of bacteria for increasing the fertility of soils; practical suggestions.

4. The relation of bacteria to milk. *a*. Milk and human disease. *b*. Fermentations of milk and their prevention; preservation of milk; special diseases of milk. *c*. The relation of bacteria to good and bad butter. *d*. The relation of bacteria to cheese making.

5. The relation of bacteria to drinking water. Water supply on the farm; diseases due to water and their prevention.

6. Special hygiene for farmers, the spread of infectious diseases on the farm; relation of the diseases of farm animals to human health. The sanitary arrangements of stables and outhouses. The healthy farm house and its surroundings.

ENTOMOLOGY—1 LECTURE PER WEEK.

The course in Entomology will consist of lectures on the injurious insects of orchard and garden crops. The student will be given an account of the external and internal anatomy of insects; of their life histories; of their injury to the various horticultural crops; and of the means of holding them in control. Specimens

of the insects under consideration will be placed before the class for examination.

Horticulture—3 Hours Per Week.

The course in Horticulture consists of lectures on the general theory and practice of orchard tillage, pruning and spraying; on the origination and improvement of varieties; on the principles underlying variety selection; on the fruits adapted to the Peninsula; on orchard machinery; on the propagation of fruits. Laboratory practice will supplement some of the lectures.

Botany—4 Hours Per Week.

The instruction in this subject will be mainly by laboratory work, including the study of specimens which will give students an idea of the general structure of plants, and their manner of growth.

Both the gross and minute structure of the leaf, stem, root, blossom and seeds of plants will be studied, together with the uses of these different organs in the economy of the plant.

Agricultural Engineering—6 Lectures.

Drainage.—*Principles and methods* of locating and constructing *under-drains.*

Construction and repair of *roads*, and their relation to the economy of the farm.

Study of practical methods of measuring land.

Agricultural Physics and Mechanics—6 Lectures.

Lectures and laboratory demonstration upon the elementary principles of physics in their relation to farm operations.

Study of the principles governing the selection, use and care of farm machinery.

Shop Work—2 Hours Per Week.

Practical instruction in the handling and care of tools for working wood, and work at forge in blacksmithing.

Civics—6 Lectures.

A discussion of the constitution and form of government of the United States and of individual states, with a view toward preparing the student for the active duties of citizenship.

Admission and Expenses.

For admission to the Winter Course in Agriculture no exami-

nation is required, but to get the most benefit from it one should at least have completed the work in the common district schools.

There is no charge for tuition.

Further information concerning the course may be had by application to the president of the College.

CIVIL ENGINEERING.

The objects of the course of instruction in civil engineering are first, to fit those pursuing it previous to professional life to be, at graduation, immediately useful as assistants to engineers in charge of structures and works; second, to meet the needs of those who, having engaged, without a preliminary scientific training, in the work of the engineer, find themselves at a disadvantage. It is believed that these ends can be attained most readily by such training as will impart accurate knowledge of natural laws and of the properties of materials, and develop power to apply intelligently that knowledge. Therefore, the technical studies are preceded by liberal and thorough instruction in language and in the mathematical and physical sciences.

Entrance Requirements are fully stated on pages 12-14. In addition, knowledge of language and natural science as taught in our high schools will contribute much to the satisfactory progress of the student. In order that those pursuing this course may derive therefrom the greatest benefit, it is recommended that their mathematical preparation, in particular, be thorough.

Degrees.—Each student who complies with all the rules of the College and satisfactorily completes this course is eligible to the degree, Bachelor of Civil Engineering, (B. C. E.) As a portion of his work in course he must prepare a written description, also such drawings as are necessary for its proper elucidation, of some structure, machine or process which he may have examined or designed. The description must be written upon regular thesis paper. It and the drawings, all of which will be retained by the College as its property, must be presented to the Professor in charge of the Department on or before the first day of May next preceding the time for the student's graduation. While throughout the preparation of this description students have the advice and aid of the Professor, in the first and second terms of the Senior

year time is allowed in the course of instruction for working upon it under his immediate direction.

Each graduate who has been engaged for three years subsequent to his graduation in practical and successful work as an engineer, and who has prepared and presented to the Faculty a satisfactory thesis upon a topic related to his profession, is eligible to the professional degree, Civil Engineer, (C. E.) The thesis and drawings are retained by the College as its property.

Description of Course.—The College, by offering different courses of study, allows opportunity for the satisfaction of individual choice; but, believing it for the best interests of the student, prescribes, particularly in the technical courses, most of the work. In each of the last two terms of the Senior year each student elects one technical study.

On pages 26 and 27 is an outline of the course in civil engineering, including a statement of the amount of time allotted to each subject. Following is a full description of the course.

FRESHMAN YEAR.

Rhetoric.—First term, two periods per week. Instruction by text-book and lectures. Text, Hill's Principles of Rhetoric.

History of the English Language.—First and second terms, one period per week. Instruction by text-book and lectures. Text, Emerson's Brief History of the English Language.

English Composition.—Entire year, one period per week. Class-room work, and essays written outside of recitation hours.

Elocution.—Entire year, one period per week. Includes voice development, pronunciation, modulation. Manual, Hafford's Drill-Book of Elocution.

American Politics.—Second term, one period per week; third term, three periods per week. Instruction by lectures and required reading.

Civil Government.—Second term, one period per week. Study of Civil Government in the United States. Instruction by lectures.

German or French.—Entire year, two periods per week. Reading, writing and oral translating. Texts; in German, Joynes-Meissner's German Grammar and German Reader; in French, Whitney's French Grammar and Super's French Reader.

Algebra.—First term, five periods per week. Ratio and proportion, variation, progressions, permutations and combinations, binomial theorem, series, logarithms. Text, Wells's University Algebra.

Geometry.—Second and third terms, five periods per week. Plane geometry and geometry of space; numerical applications. Instruction by text-book and original work. Text, Phillips and Fisher's Elements of Geometry.

Steam Engines and Steam Boilers.—Entire year, two periods per week. Description of details and of different types of engines and boilers. Instruction by text-book, use of trade catalogues and actual running of engines and management of boilers. Text, Holmes' The Steam Engine.

Drawing.—Entire year, six periods per week. Lettering for working drawings, use of instruments, geometrical constructions in one plane, conic sections, instrumental copying of machine details, orthographic projections in third angle. Manual, Anthony's Elements of Mechanical Drawing.

Shop-work.—Entire year, six periods per week. Includes:

(a) Bench-work in wood.—Includes descriptions of tools; work with saw, plane, auger, bit, chisel and kindred tools in making joints, light cabinet work and models of roof and bridge trusses.

(b) Wood-turning.—Includes use of lathe tools in straight and compound turning in soft and hard woods; caliper work, hollow turning, turning to template, screw-plate and chuck work.

(c) Bench-work in iron.—Includes work on cast and wrought iron and brass,—chipping, use of file and scraper in producing flat and curved surfaces, fitting, slotting, dovetail work, screw-cutting with taps and dies, pipe-fitting.

Students who, previous to entrance, have satisfactorily completed such a course as that described, have more advanced courses of shop-work assigned them.

Military Science and Tactics.—Entire year, three hours per week. Recitations in U. S. Infantry Drill Regulations; practical instruction in same; military calisthenics.

SOPHOMORE YEAR.

English Composition.—Two periods per week; in other respects as in Freshman year.

Elocution.—Entire year, one period per week. Includes voice development, gesture, position, delivery of selected declamations, and criticisms thereof. Manual, King's Practice of Speech.

German or French.—Entire year, two periods per week. Instruction as in Freshman year but with more attention to reading than grammar. Texts; in German, Schiller's Jungfrau von Orleans, Lessing's Minna von Barnhelm; in French, Whitney's French Grammar, Hugo's Hernani, Rostand's Cyrano de Bergerac.

Trigonometry.—First term, three periods per week. Plane and Spherical with applications. Text, Wells's New Plane and Spherical Trigonometry.

Analytic Geometry.—Second and third terms, four periods per week. Straight line, conic sections by both analytic and geometric methods. Text, Nichol's Analytic Geometry.

Mechanics.—Entire year, three periods per week. An elementary course in mechanics of both solids and fluids. Text, Taylor's Theoretical Mechanics.

Chemistry.—Entire year, three periods per week. Includes treatment of the metalloids and the metals, lectures on the leading chemical industries, also full treatment of the metallurgy of iron and steel and the production of their commercial and structural forms. Instruction by text-book, lectures and visits of inspection to steel plants and chemical works. Text, Wurtz' Elements of Modern Chemistry.

Surveying.—First term, three periods per week; second and third terms, two periods per week. Land surveying, surveys of Public Lands of the United States, resurveys, principles of leveling, descriptions of instruments. Instruction by text-book and lectures. Text, Gillespie's Treatise on Surveying (Staley), Part I.

Descriptive Geometry.—Entire year, two periods per week. Representation, in projection, of geometric magnitudes and solution of problems relating thereto; shades and shadows. Lectures and manual.

Drawing.—Entire year, three periods per week. Orthographic projections in third angle, working drawings, tracings. Manual, Anthony's Elements of Mechanical Drawing.

Field-work.—First and third terms, three periods per

week. Land surveying with chain, tape, compass and transit; elementary operations in spirit leveling.

Plotting.—Second term, three periods per week. Use of scales, protractors and other instruments in working up field-notes.

Military Science and Tactics.—Entire year, three hours per week. Recitations in U. S. Infantry Drill Regulations; practical instruction in same and in U. S. Artillery Drill Regulations; military calisthenics.

JUNIOR YEAR.

Elocution.—Entire year, one period per week. Public speaking; original orations.

German or French.—Entire year, two periods per week. Writing of connected narration; oral rendering of same. Reading in German from Lessing's Nathan the Wise and Goethe's Faust; in French from Molière, Corneille and Racine. Lectures on works read and their authors.

Analytic Geometry.—First term, three periods per week. Higher plane curves. Text, Nichol's Analytic Geometry.

Calculus.—Second and third terms, three periods per week. Differentiation and integration of the several kinds of functions; applications to problems in mechanics. Text, Hall's Elements of the Differential and Integral Calculus.

Mechanics of Solids.—Entire year, three periods per week. Analytical Mechanics. Geometric science of motion; action of force on a particle; on a rigid body; centre of gravity, moment of inertia and radius of gyration. Instruction by text-book and lectures. Text, Robinson's Elements of Dynamics.

Physics.—Entire year, three periods per week. Laws and properties of matter; sound, heat, magnetism, electricity and light. Instruction by text-book, lectures and laboratory. Text, Gage's Principles of Physics.

Chemical Laboratory.—Entire year, two periods per week. Course parallel with instruction of Sophomore year. Analysis of simple and complex substances in the wet way; analysis by use of the blow-pipe and flame reactions. Manual, Thorpe and Muir's Qualitative Chemical Analysis and Laboratory Practice.

Mineralogy.—Entire year, two periods per week. Crystallography and other physical characteristics of minerals; chem-

ical characteristics; blow-pipe analysis; practice in determinative mineralogy; study of specimens of building stone. Instruction by text-book, lectures and laboratory. Text, Dana's Minerals and How to Study them.

Surveying.—Entire year, two periods per week. Study of the theory of the construction, adjustments and use of instruments; methods of computation; theory of topographical surveying, city surveying, hydrographic surveying and mine surveying; principles for guidance in original surveys and resurveys; mathematical astronomy. Instruction by text-book and lectures. Text, Raymond's Text-Book of Plane Surveying.

Drawing.—Entire year, three periods per week. Development and intersection of surfaces; isometric drawing; free-hand sketching of structural details and of machine parts, working drawings from the sketches, tracings and blue-prints; tinting and shading. Topographical drawings from students' own field-notes during an additional three periods per week in second term.

Field-work.—First and third terms, three periods per week. Topography with transit, level, stadia, and plane table; use of sextant; triangulation; precise measurement of lines and angles; precise leveling; use of barometer; determination of altitude azimuth and time; adjustment of observations by the method of least squares.

Military Science and Tactics.—Entire year, three hours per week. Recitation in U. S. Infantry Drill Regulations; practical instruction in same; military calisthenics; signaling by flags.

SENIOR YEAR.

Elocution.—Entire year, one period per week. Continuation of work in Junior year, debates, parliamentary practice.

Calculus.—First term, two periods per week. Lengths of plane curves, areas, volumes; various applications. Instruction by text-book and lectures. Text, Hall's Calculus.

Hydromechanics.—Second and third terms, three periods per week. Hydrostatics; flow of water through orifices and tubes; flow in pipes and in conduits. Text, Merriman's Treatise on Hydraulics.

In this subject there is an advanced elective course in Hydraulics and an elective course in Pumps and Hydraulic Motors; text in the latter, Björling's Water or Hydraulic Motors.

Geology.—First and second terms, two periods per week; third term, one period per week. Principles of lithology and of microscopic petrography; dynamic, structural, physiographic and historic geology. Instruction by text-book, lectures and field-work. Text, Scott's Introduction to Geology.

Sanitary Science.—Entire year, one period per week. Water, air, food, disposal and utilization of sewage, ventilation, heating. Instruction by text-book and lectures. Text, Wilson's Hand-book of Hygiene and Sanitary Science.

Mechanics of Materials.—First term, three periods per week; second term, four periods per week. Theory of elasticity; simple stresses; strength of pipes and riveted joints; strength and stiffness of beams, columns and shafts. Investigation and design. Properties and structural forms of iron and steel. Instruction by text-book, lectures and laboratory. Text, Merriman's Text-Book on the Mechanics of Materials.

Railroad Engineering.—First term, three periods per week. Location and construction, including the theory of reconnoissance, preliminary and location surveys, curves, setting slope stakes, calculating earthwork and staking out structures. Text-book and lectures. Text, Carhart's Field Book for Civil Engineers; Nagle's Field Manual for Railroad Engineers.

In this subject there is an advanced elective course including maintenance and the economics of location. The elective course in Applied Electricity treats of the construction and operation of electric railways.

Highways.—Third term, two periods per week. Location, construction and maintenance of roads, streets and pavements, including study of tractive forces and of the properties of good road materials. Instruction by text-book and lectures. Text, Spalding's Text-book on Roads and Pavements.

Roofs and Bridges.—First and second terms, five periods per week. Lectures on the construction of the ordinary types of truss; stresses in the common forms of roof and bridge trusses by the algebraic method; principles of graphic statics; center of gravity, moment of inertia, and stresses in framed structures by graphic method; elementary problems in investigation and design. Instruction by text-book and lectures. Text, Merriman and Jacoby's Text-Book on Roofs and Bridges, Parts I. and II.

In this subject there is an advanced elective course in which

are presented in detail methods of calculation used in practice, and the principles involved and methods employed in designing, constructing and erecting framed structures. Lectures and reference books are supplemented by visits to bridge works and to structures in course of erection.

Building Construction.—First term, two periods per week. Wood and its use in construction; framing of floors, partitions and roof trusses; roofing; paints and varnishes. Instruction by text-book, lectures and visits to structures. Text, Rivington's Notes, Part I.

In the elective course are presented the subjects of fire-proofing, mill-work and tall building construction, including the various engineering features of modern building construction.

Masonry Construction.—Second term, one period per week; third term, three periods per week. General treatment of subject; emphasis of special features according to prospective needs of different students; properties of building stones; preparation of natural stone; manufacture of artificial stones; manufacture and use of limes, cements, mortars and concrete. Instruction by text-book, lectures and laboratory. Text, Baker's Treatise on Masonry Construction.

Contracts and Specifications.—Third term, three periods per week. Synopsis of law of contracts; general and special features of specifications; descriptions of related documents and of the common forms of business paper; study of actual contracts and specifications. Instruction by lectures. Reference, Johnson's Engineering Contracts and Specifications.

Thesis.—First and second terms, two periods per week. Preparation of text and drawings. See under degrees, pages 50 and 51.

Drawing.—Entire year, two periods per week. Architectural perspective, plotting of students' field-notes of railroad surveys, design of structures, use of calculating instruments.

Field-work.—First term, four periods per week. All operations involved in preliminary and location surveys for railroads. In the third term there is an alternative of three periods per week between this subject and Engineering Laboratory.

Engineering Laboratory.—Second term, four periods per week. Examination and testing strength of materials of construction, the work of this term being principally with cement. In

third term there is an alternative of three periods per week including study and use of testing machines and the minor apparatus used in connection therewith.

An elective course in Materials of Construction devoted to the further study of sources, manufacture and properties of constructive materials includes a large amount of laboratory work.

Water Supply and Sewerage are included in the elective subjects. The former deals with methods of collecting and storing water and of systems of works for its distribution; the latter with the design of sewerage systems and the design and construction of individual sewers and sewer appurtenances. Instruction by text-books, reference books, lectures and visits of inspection.

Elective Studies.—The prescribed subjects are taken by all students who pursue this course. The arrangement of elective studies enables them to give special attention to lines of study best suited to individual needs.

Non-Technical Studies.—Elsewhere, under their respective titles, the general studies of the course are more fully explained than under civil engineering.

Methods of Instruction.—Instruction is by text-book, lectures, laboratory, drafting-room, field-work and shop-work; by the use of current professional journals; and by visits, followed by carefully prepared reports, to structures in process of erection, good types of finished structures, and industrial establishments.

The chief objects in laboratory, field and shop-work are to secure mental discipline, and, by illustrating principles and impressing facts, to supplement the work of the lecture room. Without subordinating the true educational function of these methods, work is so carried on as to give the student an intelligent preparation for similar work after graduation.

The visits of inspection and reports thereon are considered very important in developing correct methods of observation and description and in forming acquaintance with engineering works and industrial processes.

Facilities for Instruction.—The Department is well supplied with the necessary instruments for laboratory and field-work. The shops are well equipped. All equipment is of the best quality and is being rapidly increased. The Department has a working library, kept up to date, containing standard works in all branches of civil engineering. It is supplied, also, with the

leading professional and scientific periodicals, both American and foreign, named in the general list on another page. Students are encouraged and taught to avail themselves of current technical matter in foreign languages as well as in their own.

Employment.—The course is in complete and successful operation. About half of those who have finished the course engaged, upon graduation, in different branches of professional work in which they continue to hold desirable positions.

DEPARTMENT OF ELECTRICAL AND MECHANICAL ENGINEERING.

Description of Studies and Methods of Instruction.

Two courses are offered in this Department.

Mechanical Engineering, a four years course leading to the degree of Bachelor of Mechanical Engineering.

Electrical Engineering, a four years course leading to the degree of Bachelor of Electrical Engineering.

Each Graduate of either of these courses will, after three years of practical and successful work in his calling, and having prepared and presented to the Faculty at least six weeks before the June meeting of the Board of Trustees a satisfactory Thesis on a topic relative to his profession be eligible to the professional degree of M. E. or E. E. according to the course he may have pursued.

Favorable opportunities for instruction are offered in these important departments of scientific and technical training. The rapid increase of our manufactures, requiring the economical utilization of all sources of power, and the design, and construction of much special machinery, open a broad field for the mechanical Engineer, while Electrical Engineering, with its growing importance, the constantly increasing number of its applications and many possibilities, is a very attractive profession.

The courses in this Department are designed to teach the principles underlying Mechanical and Electrical Engineering, and to prepare young men to design, construct and supervise machinery and electrical apparatus, and meet successfully the problems which may arise in the practice of their profession.

In addition to the strictly technical studies, students receive

instruction in the English language, Chemistry (including laboratory course, and metallurgy of iron and steel), Mathematics, Physics, German or French, together with a thorough course in Mechanics, comprising Mechanics of Solids, Mechanics of Materials, Hydromechanics, and Roofs and Bridges.

The Courses of Mechanical and Electrical Engineering are very closely allied, electric energy being now most economically developed by mechanical devices which require a motive power furnished by some prime mover, so that the installation of an electric plant requires a large amount of mechanical knowledge.

The courses, therefore, are nearly identical for the first three years. In the Senior year they differentiate, each class pursuing separately those subjects pertaining to their particular branch, while some studies remain common.

The aim is to train men to unite correct theory with practical requirements. To accomplish this fully, much stress is laid on proficiency in the actual management and care of apparatus, much time being devoted to practical work.

For this purpose the department is furnished with a well equipped wood-working, machine, and black-smith shop, and electrical laboratory containing motors, dynamo, storage battery and various testing instruments sufficient for a full course, new apparatus being added as necessary. Instruction is given under the following heads.

Language.—English includes Elocution, Composition, Rhetoric, History of the English Language, American Politics and Civil Government.

German or French are also taught, with the special design of rendering accessible to the student the scientific and technical matter contained in books and periodicals in those languages. For methods of instruction and other details, reference is made to articles under heads of English Language and Literature, and Modern Languages.

Physics, Chemistry, Metallurgy.—In these subjects there are full courses, including laboratory work, as elsewhere explained under the several heads. The course in Chemistry includes lectures on the leading chemical industries, and full treatment of the metallurgy of iron and steel and the production of their structural and commercial forms.

Drawing and Machine Design.—This course extends

through the whole four years, beginning with the Lettering and Instrumental Drawing in the Freshman year, and includes instruction in Plain, Script and Ornamental Lettering. A course in Geometrical Construction, with such parts of Descriptive Geometry as bear directly on Mechanical Drawing, problems involving orthographic and isometric projection, and the intersection and development of surfaces are worked out on the drawing board. Such exercises are given, as will best render the student familiar with the use of the drawing instruments.

Copying of machine detail follows. Attention is paid to the conventional methods of representing metals, the proper dimensions of parts, and the need of different views, sections, etc., for clearness.

Tracings and blue prints are made for shop use. Free hand sketches of machines in the shops are taken, and from some of these complete detail drawings are made in the drafting room.

The use of water colors, tinting and shading with the conventional colors for wood, metal, etc., in machine construction are also taught.

In the Senior year machine design and the drawing of special machines are taken up.

SHOP-WORK.

The work in the shops is designed to teach the construction and use of tools and machines employed in mechanical work and as a preparation for the study of machine design in the Senior year. The shops are managed as nearly as possible like those of an actual manufacturing plant. In arranging the work care is taken that the class-room and shops may be mutually helpful. Thus, in wood-working, the technical names and reasons for the different forms of joints, splices, frames, etc., constructed, are pointed out, and in the iron work the different fastenings, methods of locking nuts, etc., are constructed and explained. This method is followed throughout the course, while in the class-room reference is always made to the application in the shops of the principles discussed, drawings and descriptions being required if necessary.

Each student is required to complete a graded series of exercises in carpentry, wood-turning, pattern-making, moulding, forging and machine-shop work, designed to make him, upon their completion, able to perform any ordinary operation in a

workmanlike manner. Each class then more or less completely builds some machine as time will permit. All work is done from blue-prints made by the students. Manual skill is desired and required and all work must be done in a manner satisfactory to the instructor before it will be accepted. At the same time particular stress is laid on a thorough knowledge of the construction and care of each tool and machine, and the kind of work to which it is best adapted, together with the special work possible to perform on it. Combined written and oral examinations are held three times during the first term and twice during the second and third terms. These examinations cover the work of the terms and are extremely valuable in that they compel close attention to the instruction given and indicate to the instructor the knowledge each student has failed to acquire, thus enabling him to give just such instruction as is needed.

The courses in detail are as follows:

(a) Bench Work in Wood.—This includes the nature and use of tools, work with saw, plane, auger, bit, chisel and kindred tools, in making different joints, such as timber splices, mortises, tenons, mitres, dovetails, etc., frames, light cabinet work and roof and bridge trusses.

(b) Wood-Turning.—Comprises use of lathe tools in straight and compound turning in soft and hard woods, involving caliper work, hollow turning, turning to template, screw-plate and chuck work.

(c) Iron and Steel Forging.—This includes exercises in heating, bending, upsetting, welding, the making and tempering of punches, chisels, machine-cutting tools. Brief instruction is given in soldering, brazing and riveting.

(d) Bench Work in Iron.—This comprises work on cast iron, wrought iron and brass,—chipping, use of file and scraper in producing flat and curved surfaces, fitting, slotting, dovetail work, screw-cutting with taps and dies, pipe-fitting.

(e) Machine Work in Iron.—This includes straight and taper turning, facing and screw cutting on lathe, drilling and boring on lathe and drill press, surfacing, straight, spiral, end and gear cutting on milling machine, planing, reaming, grinding, polishing, etc.

After the regular series of exercises in iron work is completed further practice is given in the building of apparatus and complete machines from designs and drawings made at the College.

(f) Pattern Making and Moulding.—A series of patterns including patterns for pipe joints, valves, couplings and pillow-blocks, etc., is first completed and by means of these the actual process of moulding is illustrated. More complex patterns and patterns for actual machines to be constructed in the shops are then made and during the last term of the Senior year the students construct patterns from their own designs and drawings.

(g) Fitting, Erecting, and Aligning, Machinery and Shafting.—This course is given during the Senior year.

(h) Visits of Inspection.—Visits of inspection are made each year to manufacturing plants in nearby cities, and notes and sketches made of the arrangement of shops and machinery, special tools and processes and the methods of carrying on work.

(i) Special Course for Agricultural Students.—This course is adapted especially to the needs of agricultural students and includes, in wood, use and care of tools, general carpentry, joints, timber splices, framing: in iron forge work, including heating, bending, welding, making and tempering of tools, soldering, riveting; and bench work, including chipping and filing, screw-cutting with taps and dies. Practical instruction is given in managing engines and boilers.

Mathematics.—The course in pure mathematics is full and thorough; for a detailed description see article under this head page 38.

Mechanics.—A very full course is given in mechanics both theoretical and applied;—in the Sophomore year an elementary general course;—in the Junior and Senior years an advanced course in mechanics of solids and hydromechanics, the latter including hydrostatics, flow through orifices, through tubes, in pipes and in conduits;—in the Senior year a course in mechanics of materials and of beams and columns. An engineering laboratory course in the properties and strength of materials illustrates and supplements the text-book and lectures.—*Text-Books, Robinson's Mechanics, Merriman's Hydraulics.*

Surveying.—Text-book work, lectures and field work in the Sophomore year, include description of instruments used, and methods employed, in land surveying, triangulation, topographical surveying, leveling, hydrographic, mining, city and railroad surveying.—*Text-books used, Gillespie's and Raymond's Surveying.*

Steam Engines and Boilers.—This course, given in the

Freshman year, is intended to familiarize the student with the names and uses of the parts of engines, boilers, pumps, etc., and their attachments, and with their proper management. In addition to the text-book, trade catalogues and the technical journals are used to illustrate the more prominent types and to teach the modern methods of management. Practical instruction is given in running engines and boilers.—*The Steam Engine, Holmes.*

Kinematics.—This includes a study of the transmission of motion by machine parts, such as clutches, belts, cams, screws, gearwheels, links, etc. The teeth of wheels are constructed and velocity diagrams for the various motions are laid down, many problems being worked out on the drawing board.—*Elementary Mechanism, Stahl & Wood.*

Graphical Statics of Mechanism.—The graphical methods of obtaining the equilibrium and efficiency of mechanisms are taught. The harmful resistances caused by friction are considered and numerous problems are worked out on the drawing board.—*Graphical Statics, Hermann-Smith.*

Valve Gears.—The action of valves is studied and the Zeuner diagram as applied to the Stephenson link, and to the radial and automatic cut-off gears. The ball governor is considered. Much of the work is done on the drawing board.—*Spangler's Valve Gears.*

Roofs and Bridges.—In lectures in the first and second terms of the Senior year the common forms of trusses are briefly described and their construction explained. The methods of determining the stresses in framed structures by both algebraic and graphic processes are fully set forth; the student, by solving many and varied illustrative problems, making constant application of the knowledge acquired.—*Merriman's Roofs and Bridges.*

Contracts and Specifications.—This course includes a presentation of the law of contracts, a treatment of the general features of engineering specifications with descriptions of the related documents and their uses, and of the common forms of business paper.—*Johnson's Contracts and Specifications.*

Thermodynamics.—This includes thermodynamics of gases, of saturated and superheated steam, with application to steam and gas engines and injectors.—*Röntgen-DuBois.*

Steam Engine Design.—Each student is required to design the principal parts of a steam engine, calculating for strength,

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appearance, and cost of manufacture. Some of the details are fully worked out and working drawings for them are made. Lectures are given on the theory of compound and triple expansion engines and condensers.—*Steam Engine Design, Marks.*

Machine Design.—Some time is given to the *Materials of Engineering* after which the proper proportioning of screwed and keyed fastenings and the simpler transmission machinery is taken up. This is followed by the design of shop-tools or some special machine. Each class will, if possible, work out one or more designs and furnish working drawings and sketches of the details. —*Machine Design, Low & Bemis.*

Steam Boiler Design.—This includes value of fuels, efficiency of heating surfaces of types of boilers, size of parts, allowing for strength and corrosion, arrangement of flues and chimneys, of steam and feed pipes, and methods of setting. Students are required to calculate the parts of a steam boiler and to furnish drawings for a boiler and setting, from their own designs.—*Steam Boilers, Peabody & Miller.*

Pumps and Hydraulic Motors.—Pumps, both reciprocating and rotary are studied, but the time is given chiefly to turbine wheels.—*Water and Hydraulic Motors, Björling.*

Transmission of Power.—This includes a study of the arrangement of machinery and methods of transmitting power, both mechanical and electrical. Visits are made to engineering plants in the neighboring cities, and written descriptions and sketches are required of the arrangement of the machinery, shafting, belting, etc.

Laboratory Courses in Steam Engineering.—Management of engines and boilers is first taught. Next follows measurement of weights, volume, area, temperature, etc., use of indicator, tests of pressure gauges, of quality of steam, power and efficiency tests of steam and gas engines, boilers, injectors, etc. The quality of lubricating oils, amount of friction, etc., is experimentally determined and the power used by machines is measured. *Hydraulic experiments* cover flow of water over weirs, through tubes, efficiency of pumps, etc.

ELECTRICAL ENGINEERING.

Electrical Engineering.—In addition to the subjects common to both branches of engineering descriptions of which have been given under Mechanical Engineering, the following subjects come specially under the above course.

Electricity.—As a preparation for these courses, a course in elementary Electricity and Magnetism is given in the Junior year.

Electrical Measurements.—Class-room instruction includes construction and calibration of testing instruments, the measurement of currents, potential, resistance, capacity, insulation, etc. Some time is given to photometry.

Laboratory work closely follows the class-room instruction. At first very close supervision is given to the work, that correct methods of using the apparatus may be acquired, after which the student is left more and more to his own resources in order that he may gain confidence in himself.—*Electrical Measurements, Carhart & Patterson.*

Direct Current Dynamo-Electric Machinery.—The laws of electro-magnets and of magnetic circuits are first studied and the principles are applied to dynamos and motors, the design and construction of the parts being taken up in detail. Attention is given to the characteristic curves and the efficiencies of the different types.—*Dynamo Electrical Machinery, Thompson.*

Alternating Current Machinery is next taken up, the design and construction of dynamos, motors and transformers being treated as in direct current work.

Electric Machinery Design.—After the theoretical and practical courses in Dynamo-Electric Machinery are completed, the knowledge gained is applied to the design of some piece of electrical machinery, each student being required to design parts of a dynamo, motor or transformer.

The courses in Designing Machinery are intimately associated with the shop and laboratory courses and the work is carried on as nearly as possible like that of the engineering drawing office. The department is in possession of many working drawings of machine-tools, engines, boilers, etc., which have been generously given by many of the leading manufacturing firms. Constant reference is made to them, and to trade catalogues, a full set of which is kept in the department.

Laboratory Work.—After management of dynamos has been acquired, time is given to the electro-magnet and tests of reluctance, inductance, hysteresis and leakage are made. Characteristic curves and efficiencies are found for different type machines. On account of the growing importance of storage batteries considerable time is given to their construction and management.

Applied Electricity.—A study is made of electricity as applied to domestic purposes, including electric bells, annunciator work, gas-lighting, fire and burglar alarms, etc., electric telegraph and telephones. Attention is given to electro-deposition of metals, including electro-plating, electro-typing and smelting and refining metal.

A study is made of the arrangement of generating plants, erection of distributing lines and interior wiring on the different systems, arc and incandescent lamps, distribution of power to mills, etc., from central plants, electric railways, including lines, circuits, and motors with methods of control. This work is supplemented by visits of inspection to lighting and power plants and by constant reference to the current electric journals.

Laboratory work includes wiring, testing of lines, lamps, etc., and general management of electrical apparatus.

MILITARY SCIENCE AND TACTICS.

By the Act of Congress, July 2d, 1862, establishing colleges for the benefit of Agriculture and the Mechanic Arts, military science and tactics become a part of the work of instruction. All students not in the Senior class are required to take military instruction and drill, unless specially excused by the Faculty on account of physical disability or because of conscientious scruples on the part of their parents.

Members of the Senior class may, at their option, take the Military course, but they must signify their intention to do so at the beginning of the collegiate year, and must for that year unless excused by the Faculty, remain in the Military Department, subject to its rules and regulations.

In Delaware College the military instruction and drill are in charge of an officer of the regular army. The course of instruction is both theoretical and practical.

The theoretical instruction, one hour a week, is confined to the winter term.

The first year's course consists of the Drill Regulations of the three arms of the U. S. Army, so far as each pertains to the practical instruction given in that arm.

The second year's course embraces "Notes on Military Science and the Art of War," and the preparation of the usual reports and returns pertaining to a company.

Lectures on military subjects are delivered throughout the year to those taking the course.

PRACTICAL INSTRUCTION EMBRACES.

1. MILITARY GYMNASTICS AND ATHLETICS.
2. INFANTRY.—The School of the Soldier, the Company and the Battalion, including the ceremonies of guard mounting, dress parade, reviews, and inspections.
3. ARTILLERY.—The School of the Soldier dismounted, manual of the piece, etc.
4. SIGNALING.—Transmission of messages by means of flags.

The National Government supplies all arms, ammunition and equipments; and the College, all military text-books. The only expense incurred by the student in taking this course is his uniform. The uniform adopted is a cadet gray,—strong, neat, and serviceable,—costing from $13.50 to $16.50.

LIBRARIES.

The combined libraries of the College contain about 10,600 volumes, about 600 bound volumes having been added during the past year.

Each department of instruction has its own library of reference works in its class room or laboratory, under the immediate supervision of the professor in charge, from which students may draw books for use in connection with their work.

The general library in which are most of the books on literature, history, economics, philosophy, etc., is, together with the reading-room, open to students at all times of the day and evening.

This library is classified on the Dewey system and a shelf-list intended to serve also as a catalogue is kept complete.

New books are continually being added, so that the libraries

may fairly represent current thought on all subjects connected with the college work.

The library has been designated as one of the depositories for the public documents of the United States government and from this source receives many valuable publications.

Several friends of the college have made valuable additions to the library by the presentation of books, magazines and pictures.

READING ROOM.

On the second floor of the Recitation Hall a large well-lighted room is given up for a reading-room and general library. Ample seating capacity is provided for as many students as may wish to use the room at any time, and the following list of periodicals will show the character and scope of the literature provided.

The most useful of these periodicals are bound and placed on the library shelves thus becoming a valuable part of our book collection.

Educational Review.
School Review.
Educational News.
Education.
Journal of Education.
Forum.
North American Review.
Review of Reviews.
Critic.
American.
Outlook.
Nation.
Fortnightly Review.
Contemporary Review.
Nineteenth Century.
Athenaeum.
Quarterly Review.
Weekly Times. (London.)
Punch.
Revue des Deux Mondes.
Journal des Debats.
L'Illustration.
Le Monde Illustré.
Illustrirte Zeitung.
Book Reviews.
Literature.
Scientific American Supplement.
Popular Science Monthly.
Sanitarian.
Nature.
Science.
American Naturalist.

Popular Astronomy.
Journal of the Society of Arts. (London.)
Army and Navy Register.
Farmer's Voice.
American Grange Bulletin.
Practical Farmer.
Advocate of Peace.
Presbyterian.
Peninsula Methodist.
Delaware Churchman.
Harper's Weekly.
Harper's Monthly.
Scribner's.
Century.
Atlantic.
McClure's.
Outing.

Besides these publications which are open to students at all times, each department has several technical journals available to those interested. The list of these journals follows:

Journal D' Agriculture Pratique.
Annales Agronomiques.
Physical Review.
Astro-Physical Journal.
Zeitschrift für Physikalischen and Chemischen Unterricht.
Zeitschrift für Instrumenten-kunde.
Annalen der Physik und Chemie.
Philosophical Magazine.
American Mathematical Journal.
Annals of Mathematics.
Mathematical Gazette.
American Mathematical Monthly.
Bulletin of the American Mathematical Society.
Railroad Gazette.
Engineering Record.
Engineering News.
Engineering Magazine.
The National Builder.
Home Study Magazine.
Municipal Engineering.
Bridges.
Proceedings of American Society of Civil Engineers.
Journal of the Association of Engineering Societies.
Wisconsin Engineer.
L'Electricien.
Electrical Engineer.
Western Electrician.
Electrical World.
Engineering.
Power.
American Machinist.
Scientific American.
American Journal of Science.
Proceedings of the Royal Society.
Proceedings of the Royal Institution.
Engineering and Mining Journal.
Zeitschrift für Krystallographie und Mineralogie.
Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege.

Neues Jahrbuch für Mineralogie, Geologie und Paleontologie.
Tschermak's Mineralogische und Petrographische Mittheilungen.
Meyer's Jahrbuch der Chemie.
Jahres-bericht für Hygiene.

Through the courtesy of the publishers, many of our State papers are regularly found on the tables of the Reading Room.

GENERAL REMARKS.

Apparatus.—The various scientific departments of the College are well equipped with modern apparatus of the most approved form, and additions are made as the needs of instruction and advances of science demand.

Laboratories.—The several scientific departments have large well lighted laboratories supplied with water and gas, and furnished with ample equipment of apparatus and appliances. The importance of laboratory work in scientific study is duly recognized, and the instruction is greatly enriched in effectiveness and increased in disciplinary value.

The Work-Shops.—The work-shops contain iron and wood-working tools sufficient for a thorough course in the best modern shop practice. There are also housed in the shops, engines, dynamos, motors and other necessary appliances for mechanical and electrical testing and measurement.

Mineralogical Cabinet.—The College possesses valuable geological and mineralogical collections systematically arranged and readily accessible for use.

Natural History Collections.—The College already has the nucleus of a Museum of Natural History, in the shape of the collections of invertebrates and skeletons, mentioned under Zoölogy.

In addition to this material it has several Auzoux models illustrating different forms or parts of animals.

In order that these collections may be increased and thus become more valuable to all connected with the institution, we request the friends of the College who may come into possession of specimens suitable for a museum to correspond with us relative to their preservation. It is especially desirable for us to build up a museum which shall contain representatives of all animals and plants found wild in Delaware.

Department Libraries.—Each department of the College possesses a special library of standard books and journals under

the immediate care of the professor in charge. These libraries are open to the students at all times during College hours.

Visits to Manufactories.—Opportunities will be given each year for students to visit the excellent manufacturing establishments of Wilmington, Chester, Baltimore and Philadelphia, where they, in company with a competent professor, may witness and study the practical application of science, as illustrated in the most successful manufactories in the country.

State Chemist.—The professor of chemistry in the College is by legislative enactment ex-officio State Chemist for Delaware.

State Bacteriological and Pathological Laboratory.—During the year by Act of the Delaware Legislature, a State Bacteriological and Pathological Laboratory has been established. The offer of the College to give room for the laboratory and to furnish the trained supervision of the Bacteriologist of the Experiment Station was accepted. The laboratory is under the management of the State Board of Health. Its location makes accessible the resources of the college in the way of libraries and apparatus. Under the provisions of the Law, the general direction of the scientific work of the Laboratory is in the hands of Professor Frederick D. Chester, as Bacteriologist. A. Robin, M. D., was appointed by the State Board of Health as Pathologist of the Laboratory and assumed the duties of the position April 1, 1899.

Examinations.—Examinations in all subjects are held at the close of each term and are conducted either in writing, or orally, as the nature of the subject may require or as the professor may prefer. Review examinations are also held at other times whenever, in the judgment of the professor, the objects of instruction may be promoted by such means. The examinations are designed not as mere tests of the student's knowledge, but as a valuable training in rapid, concise and accurate expression. They serve as a valuable means of giving the student a ready command of his mental powers and, by encouraging a review of a period of work, they give him a broader view and a firmer hold of the different subjects of study.

In determining a student's fitness to proceed to a higher class great weight is given to the character of his performance of recitation room duties. The results of the term examinations are combined with the recitation records, but in fixing the student's standing the quality of his recitation work is the weightier factor.

In the case of failure to pass in any study, the student must satisfy the professor in charge that he has made up his deficiency before the condition can be removed. Reasonable opportunities will be given him to show by examination that he has qualified himself to take good standing in the subject in which he was found deficient.

If at the beginning of any year a student's record of the preceding year shows that he is deficient in too many subjects to maintain his class standing he will not be advanced, but will be required to go over the work in which he has failed. If such condition is brought about by idleness and neglect, change of habit or withdrawal from the College will be required. Every encouragement will be given to the willing and earnest student, but his best interests demand that he shall not undertake what he is not prepared to perform.

Reports.—At the close of every term a report of each student's combined recitation and examination record will be sent to his parent or guardian. These reports show the course of study the student is pursuing and the class in which he is enrolled. Parents are urged to give them close attention and to co-operate with the faculty in correcting habits of idleness and indifference when the reports indicate any lack of attention to duty.

Attendance.—Students are required to be regular in attendance upon College duties.

Any student who does not return punctually at the opening of a term must present a satisfactory excuse, in writing, from his parent or guardian, and sustain an examination in the studies pursued by his class during his absence. The same rule applies to such as lose a part of their course by absence during the term unless specially excused by the Faculty.

Students are required to occupy such rooms as may be assigned to them by the President, and are not allowed to remove without his permission.

Religious Instruction.—The College is in no sense sectarian, but every student is expected to attend public worship at least once each Sunday at such place as the parent or guardian may select. All the students, except such as may be excused are required to be present at the daily morning prayers.

Government.—Discipline is administered by the Faculty. The government is mild but firm. Sound principles of morality

are inculcated, and sentiments of manliness, honor, and self-respect are impressed upon the students. Misbehavior is reprimanded privately, and for gross disorder the parent or guardian is notified and requested to remove the offender. Suspension or expulsion is the last resort.

Students are not allowed to visit saloons or other places of resort that might injuriously affect their morals.

Under ordinary circumstances students will not be permitted to visit neighboring cities and towns without the permission of their parents or guardians, or of the President of the College. Permission granted by parents or guardians must be written and deposited with the President.

Every student, upon entering the College is furnished with a printed copy of the laws and regulations for the government of the institution.

EXPENSES.

	1st Term.	2d Term.	3d Term.
Tuition	$24.00	$18.00	$18.00
Fuel for Oratory and Recitation Rooms	1.00	.75	.25
Janitor's fee for care of Recitation Rooms, etc.	1.50	1.25	1.25
Use of Library	1.00	.75	.75
Incidental Expenses	1.00	.75	.75
Total for Students not rooming in College	$28.50	$21.50	$21.00
" " those having Free Scholarships	4.50	3.50	3.00

EXTRA FOR STUDENTS ROOMING IN THE COLLEGE.

Room Rent	$ 4.00	$ 3.00	$ 3.00
Heat for Rooms	4.00	3.00	1.00
Janitor's Wages for care of Rooms	1.50	1.25	1.25
Total for Students rooming in the College	$38.00	$28.75	$26.25
" " those having Free Scholarships	14.00	10.75	8.25

Tuition is free for all students from Delaware.

In addition to the foregoing charges, each student, upon entering the College, will pay $5.00 as an entrance fee.

Students in Chemistry are charged a fee of $2.50 a term for such articles as are consumed in making experiments.

The students rooming in the College dormitory have formed an association, in which table board is furnished at less than $3.00 a week.

Room furniture, including bedstead, mattress, bolster, washstand, study-table and chairs, is rented to students at the rate of $3.00 each a year for the use of the furniture when two room together, or $5.00 a year when the student rooms alone. Students may furnish their own rooms if they prefer. They provide for themselves lights, books, and stationery.

PAYMENT.—*College bills for each term are due and payable in advance.* In case of prolonged absence from sickness, casualty, or other sufficient cause, a proper amount of the term payment will be refunded to the student.

Damages are assessed on the perpetrators if discovered; otherwise on all students.

All arrearages must be paid or provided for before the candidate for graduation shall be entitled to receive a diploma.

PRIZES.

THE BISHOP COLEMAN PRIZE.

The Rt. Rev. Leighton Coleman, LL. D., S. T. D., Bishop of Delaware, offers an annual prize of twenty-five dollars to be awarded to the member of the graduating class having in all respects the best standing in the Senior year.

THE ALUMNI PRIZE.

The Alumni Association offers an annual prize of thirty dollars for the best declamation at the public contest open to all students below the Senior Class. Should the merits of several contestants make it difficult to decide in favor of anyone, the prize may be divided.

THE SOPHOMORE ENGLISH LITERATURE PRIZE.

John P. Cranford, Esq., of New York City, offers a prize of fifty dollars to the student of the best standing in English Literature in the Sophomore Class of the year 1898-'99.

Elocution and Public Speaking are required in all Courses.

DEGREES CONFERRED AT THE ANNUAL COMMENCEMENT HELD JUNE 15, 1898.

GRADUATE DEGREES.

BACHELOR OF ARTS.

Joseph Fergus Brewster,
George Norton Davis,
George Edgar Folk,
Edmund Spenser Hellings,
Hugh Martin Morris,
John Timothy Mullins.

BACHELOR OF CIVIL ENGINEERING.

Lewis Reese Springer.

BACHELOR OF ELECTRICAL ENGINEERING.

James Vance Craig,
Edwin Krause,
Emmet Lawrence Tosney.

Prizes Awarded at the Commencement of 1898.

"The Bishop Coleman Prize."

Twenty-five Dollars.

Edmund Spenser Hellings.

The Alumni Prize for Elocution.

First Prize, $15.00—Andrew Marvel.

Second Prize, $10.00—Everett C. Johnson.

Third Prize, $5.00—Harley K. McCabe.

The Cranford English Literature Prize.

Fifty Dollars.

Reginald Constable.

The Roberts Medal for Best Drill.

Company A., James V. Craig, *Captain*.

GRADUATE STUDENTS.

CONNER, SAMUEL LUCAS, B. A., 1897, Wilmington.
Latin and Greek.

ELLIS, ALFRED LEE, B. C. E., 1893, B. A., 1896, Newark.
Biology.

JAQUETTE, JAMES DAVID, B. S., 1889, Newark.
French.

MCINTIRE, GEORGE, B. A., 1896, Delaware City.
French, German, Anglo-Saxon and English Literature.

MORRIS, HUGH MARTIN, B. A. 1898, Greenwood.
Modern Languages, History and English Literature.

PIERCE, IRA LISTON, B. S., 1897. Wilmington.
Chemistry.

SENIOR CLASS.

NAMES.	COURSES.	RESIDENCES.
Armstrong, Howard Malcolm	Lat. Sci.,	Cooch's Bridge.
Brown, Joseph West	Elect. Eng.,	Odessa.
Du Hadway, Louis	Lat. Sci.,	Milton.
Green, Harold	Mech. Eng.,	Middletown.
Johnson, Everett Clarence	Lat. Sci..	Selbyville.
Lewis, Charles Edwin	Elect. Eng.,	Newark.
MacSorley, Frank Olin	Lat. Sci.,	Pocomoke City, Md
Marshall, Andrew Donnell	Classical,	Milford.
McCabe, Edward Henry, Jr.,	Lat. Sci.,	Dagsborough.
McCabe, Harley King	Lat. Sci.,	Selbyville.
Medill, George Lodge	Lat. Sci.,	Newark.
Reed, Richard Paul	Civil Eng.,	Wilmington.
Vickers, Harrison Wilson, Jr.,	Classical,	Chestertown, Md.
Wells, George Harlan	Lat. Sci.,	Elkton, Md.
Wood, Willard Franklin	Mech. Eng.,	Newport.
Woodall, Edward, Jr.,	Civil Eng.,	Royal Oak, Md.

JUNIOR CLASS.

NAMES.	COURSES.	RESIDENCES.
Ayars, Edward James	Civil Eng.,	Wilmington.
Baynard, Samuel Harrison, Jr.,	Lat. Sci.,	Wilmington.
Baxter, Thomas George	Special,	Slaughter.
Conner, William Henry	Lat. Sci.,	Wilmington.
Constable, Reginald	Classical,	Elkton, Md.
Hartman, Alfred Hanson	Civil Eng.,	Wilmington.
Hirsh, William Louis	Elect. Eng.,	Osceola Mills, Pa.
Hyland, Charles Scott	Civil Eng.,	Wilmington.
MacSorley, James Roe	Lat. Sci.,	Newark.
Mason, Roger Owen	Lat. Sci.,	Newark.
McKeon, Thomas Becker	Elect. Eng.,	Newark.
Nivin, Thomas Rankin	Lat. Sci.,	Strickersville, Pa.
Sentman, Jacob Elmer	Lat. Sci.,	Newark.
Sharp, Hugh Rodney	Lat. Sci.,	Lewes.
Trotter, West Alexander	Lat. Sci.,	Wilmington.
Woodward, George Daniel	Elect. Eng.,	Wilmington.

SOPHOMORE CLASS.

Armstrong, Eugene Victor	Gen. Sci.,	Cooch's Bridge.
Baker, Elisha Monroe*	Irregular,	Selbyville.
Cann, John Pearce	Classical,	Kirkwood.
Cann, Richard Thompson, 3d,	Lat. Sci.,	Kirkwood.
Cheney, Lowther	Classical,	Henry Clay.
Crothers, Emerson Ralph	Special,	Oakwood, Md.
Crothers, Omar	Special,	Oakwood, Md.
Evans, Fred	Civil Eng.,	Henry Clay.
Grant, Archibald	Classical,	Granite, Md.
Griffin, Edgar Byron	Lat. Sci.,	Newark.
Maier, Harry Ludwig	Civil Eng.,	Wilmington.
Marshall, William, Jr.,	Classical,	Milford.
McComb, Henry Goodman	Lat. Sci.,	Wilmington.
McCoy, John Willard	Lat. Sci.,	New Castle.
McDonald, Cecil Clark	Lat. Sci.,	Newark.
McMullin, William Norman	Lat. Sci.,	St. Georges.
Naudain, William Peoples	Agriculture,	Stanton.
Ott, Samuel J.	Mech. Eng.,	Wilmington.
Paxson, Harold Knight	Classical,	Summit Bridge.

*Received instruction in History and Greek.

NAMES.	COURSES.	RESIDENCES.
Rickards, Joseph Waples	Gen. Sci.,	Ocean View.
Smith, Lawrence DeHaven	Lat. Sci.,	Newark.
Smith, William Henry	Gen. Sci.,	Newark.
Stockly, Charles Daniel	Lat. Sci.,	Smyrna.
Tunnell, Harry Edwin	Elect. Eng.,	Georgetown.
Tunnell, Herbert Rodney	Mech. Eng.,	Georgetown.
Wolf, Theodore Rudolph, Jr.,	Mech. Eng.,	Newark.

FRESHMAN CLASS.

Bennett, Asa	Gen. Sci.,	Ocean View.
Clifton, Alfred Lee	Classical,	Smyrna.
Cooper, Curtis Calvin	Lat. Sci.,	Wilmington.
Evans, Harry Cleaver	Civil Eng.,	Elkton, Md.
Evans, William Sterling	Classical,	Elkton, Md.
Fader, William Lewis	Elect. Eng.,	Newark.
Green, Lucien	Agricultural,	Middletown.
Harrington, Willis Fleming	Lat. Sci.,	Farmington.
Huxley, John Wagstaff, Jr.,	Lat. Sci.,	Wilmington.
Jones, Pusey	Civil Eng.,	Wilmington.
Kelley, George Dougles	Civil Eng.,	Middletown.
McCausland, Frank Noyes	Elect. Eng.,	Wilmington.
McClurg, James Patterson	Special,	Nottingham, Pa.
McDaniel, George Glenn	Elect. Eng.,	Wilmington.
Miller, Jonas	Elect. Eng.,	Henry Clay.
Mitchell, Charles Godfrey,	Special,	Baltimore, Md.,
Mitchell, Robert Levis	Lat. Sci.,	Elkton, Md.
Prouse, Clarence Martin	Classical,	Red Lion.
Speakman, Cummins Elliot S.	Gen. Sci.,	Smyrna.
Stewart, David, Jr.,	Elect. Eng.,	New Castle.
Talley, Perle Clearwater	Civil Eng.,	Wilmington.
Warburton, Henry Arlington	Lat. Sci.,	Elkton, Md.

SHORT COURSE IN AGRICULTURE.

Dean, William Homewood . . . . . Newark.
Derrickson, Aquila Quimby . . . . . Marshallton.
Gorry, Joseph . . . . . Wilmington.
McCauley, John Hayes . . . . . Leeds, Md.

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Battalion of Infantry.

Cadet Major, Everett C. Johnson.

Adjutant, 1st Lieutenant H. W. Vickers, Jr.

Acting Sergeant Major, 1st Sergeant Reginald Constable.

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H. L. Maier.

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1st Lieutenant H. W. Vickers, Jr.,
Commanding Platoon.

Chief of Right Section.
Reginald Constable.
Gunner, L. D. Smith.

Chief of Left Section.
T. R. Nivin.
Gunner, C. D. Stockly.

Signal Detachment.

1st Lieutenant H. G. Wells,
Commanding Detachment.

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FRONT VIEW OF DELAWARE COLLEGE.

LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

CATALOGUE

OF THE

OFFICERS AND STUDENTS

OF

DELAWARE COLLEGE,

NEWARK, DELAWARE,

FOR THE YEAR 1899-1900,

AND ANNOUNCEMENTS

FOR THE YEAR 1900-1901.

THE JOHN M. ROGERS PRESS,
WILMINGTON, DEL.
1900.

CALENDAR, 1900-'01.

June 11–18—Annual Examinations.
June 17—Baccalaureate Sermon, 8 p. m.
June 18—Monday, Class Day Exercises, 3 p. m.
Oratorical Contest, 8 p. m.
June 19—Tuesday, Meeting of the Board of Trustees, 11 a. m.
Anniversary of the Athenæan Literary Society, 8 p. m.
June 20—Wednesday, Commencement Exercises, 10.30 a.m.
Meeting of the Alumni, 2.30 p. m.
Exhibition Drill, 3.30 p. m.
Anniversary of the Delta Phi Literary Society, 8 p. m.
June 22–23—Friday and Saturday, Examination of Candidates for Admission.

SUMMER VACATION.

FALL TERM.

Sept. 11–12—Entrance Examinations at the College, beginning at 10 a. m., Tuesday, September 11th.
Sept. 13—Classes organized, College Work begins 8.35 a.m.
Dec. 17–21—First Term Examinations.
Dec. 21—Friday, First Term ends.

WINTER VACATION.

WINTER TERM, 1901.

January 2—Wednesday, Second Term begins, 8.35 a. m.
March 25—Monday, Meeting of the Board of Trustees, 11 a. m.
March 25–29—Second Term Examinations.
March 29—Friday, Second Term ends.

SPRING VACATION.

SPRING TERM.

April 8—Monday, 8.35 a. m., Third Term begins.
June 10–17—Annual Examinations.
June 16—Sunday, Baccalaureate Sermon, 8 p. m.

Hall coll.
P495

June 17—Monday, Class Day Exercises, 3 p. m.
Oratorical Contest, 8 p. m.

June 18—Tuesday, Meeting of the Board of Trustees, 11 a. m.
Anniversary of the Athenæan Society.

June 19—Wednesday, Commencement Exercises.
Meeting of the Alumni.
Exhibition Drill.
Anniversary of the Delta Phi Society.

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EUGENE W. MANNING, M. A., PH. D.,
Professor of Modern Languages.

ELISHA CONOVER, M. A.,
Professor of Latin and Greek.

CAPTAIN E. S. AVIS, U. S. A. (retired),
Professor of Military Science and Tactics, Commandant of Cadets, and Instructor in Mathematics and Engineering.

N. H. BROWN, M. E., M. A., PH. D.,
Assistant Professor of Mechanical and Electrical Engineering.

REV. WILLIAM H. PURNELL, M. A., LL. D.,
Instructor in Psychology, Ethics, Logic, Law and Elocution.

LEE O. WILLIS, B. M. E.,
Instructor in Shopwork.

IRA L. PIERCE, M. S.,
Instructor in Chemistry.

ARTHUR T. NEALE, PH. D.,
Lecturer in Agriculture.

FREDERICK D. CHESTER, M. S.,
Lecturer in Mycology.

CHARLES L. PENNY, M. A.,
Lecturer in Agricultural Chemistry.

G. HAROLD POWELL, M. S.,
Lecturer in Horticulture.

E. DWIGHT SANDERSON, B. S. A.,
Lecturer in Entomology.

FREDERIC H. ROBINSON,
Secretary of the Faculty.

WILLIAM H. BISHOP,
Librarian.

ORGANIZATION OF THE DELAWARE COLLEGE EXPERIMENT STATION.

GOVERNING BOARD.

The Trustees of Delaware College.

BOARD OF MANAGEMENT.

The Station Council composed of the President of the College, the Agricultural Committee and the Staff of Station Workers.

GEORGE A. HARTER, President.
ARTHUR T. NEALE, Vice President.
WILLIAM H. BISHOP, Secretary.

STAFF OF STATION WORKERS.

ARTHUR T. NEALE, Ph. D., Director and Agriculturist.
FREDERICK D. CHESTER, M. S., Mycologist.
CHARLES L. PENNY, M. A., Chemist.
WILLIAM H. BISHOP, B. S., Meteorologist.
G. HAROLD POWELL, M. S., Horticulturist.
E. DWIGHT SANDERSON, B. S. A., Entomologist.

DELAWARE COLLEGE.

DELAWARE COLLEGE is situated at Newark, a quiet, well-ordered, and hospitable village of fifteen hundred inhabitants in the North-western part of the State. Newark is connected with Philadelphia, Wilmington, Baltimore and Washington by the Pennsylvania, and Baltimore and Ohio railroads, and there are few points in Delaware or in the Peninsular counties of Maryland distant from the village more than four hours by rail. The region about Newark is one of the most healthful and beautiful on the Atlantic slope. The site of the College, near the center of the town, is one of unusual charm. The village has a supply of excellent water and is lighted by electricity.

Delaware College was chartered in 1833 by Act of the Delaware Legislature, and the doors of the College were first opened to students in May of the following year. The College had been doing for a quarter of a century an important work, not only for Delaware, but as well for neighboring parts of Pennsylvania and Maryland, when by a succession of misfortunes, she was forced in the spring of 1859 to close her doors.

Eleven years later the College was resuscitated, having meanwhile been designated by Act of the Delaware Legislature as beneficiary under the Act of Congress apportioning to each of the several States large areas of public lands to form the basis of endowments for Colleges especially devoted to the teaching of Agriculture and the Mechanic Arts, and Military Tactics. This Act of Congress, commonly known as the "Morrill Bill" from its originator, Senator Morrill of Vermont, declares that the Colleges made beneficiary under its provisions shall have as their leading object, "without excluding other scientific and classical studies and including Military Tactics, to teach such branches of learning as are related to Agriculture and the Mechanic Arts * * * * * * in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." In consideration of the adoption and establishment of Delaware College as the institution to be provided by the State of Delaware in accordance with the provisions of the Act of Congress in question, "a joint and equal interest in the grounds, buildings, libraries and vested funds of the College proper" was conveyed to the State of Delaware and equal representation upon the Board of Trustees was given the State.

RECITATION HALL.

LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

The Board of Trustees, when full, consists of fifteen members representing the original Board, and fifteen members on the part of the State appointed by the Governor, five from each of the three counties. The Governor of the State and the President of the College are members *ex-officio.*

In 1888, by Act of the Delaware Legislature, the Delaware College Agricultural Experiment Station was established in connection with the College under the provisions of an Act of Congress approved March 2, 1887, commonly known as the "Hatch Bill," appropriating $15,000 annually for the purpose of "acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture and to promote scientific investigation and experiment respecting the principles and applications of Agricultural science under direction of the College or Colleges established in each of the States and Territories" in accordance with the provisions of the "Morrill Bill."

Delaware College is beneficiary also under a further Act of Congress, known as the "New Morrill Bill," approved August 20th, 1890, which appropriated for the year then current $15,000 to each State for the "Land Grant Colleges" and provided for the increase of the appropriation by $1,000 each year until it should reach $25,000 a year. Delaware College receives annually four-fifths of this appropriation, one fifth, in accordance with the provisions of the bill, being applied to the maintenance and support of the College at Dover for the education of colored students.

The appropriations provided for in this act are to be applied "to instruction in Agriculture, the Mechanic Arts, the English Language and the various branches of mathematical, physical, natural and economic sciences with special reference to their applications in the industries of life, and to the facilities for such instruction."

Stimulated by the increased income provided by this last Act, Delaware College has within the past seven years enlarged her corps of instructors and greatly increased her equipment of apparatus and appliances, so that she is now vastly better able than ever before in her whole history to perform her appointed duty.

The buildings of the College, situated in an ample and beautiful campus, shaded by trees as old as the institution itself, consist of the Dormitory, a large brick structure originally the sole College building and still occupied in part by laboratories,

the old library, the literary societies and recitation rooms; Recitation Hall, a handsome brick building erected by the State in 1891; the wood-working shop and the machine shop, where are housed machinery and apparatus for a thorough practical course of instruction in the mechanic arts; the gymnasium and drill hall, which is amply equipped for indoor physical exercise.

The experiment Station occupies a building on the College grounds which contains offices, libraries and laboratories of the station workers. The Station has also a green-house, with laboratory adjoining, in the rear campus, and several buildings used for storage and other purposes in the conduct of the various lines of experimental work.

A considerable part of the rear campus is occupied as an athletic field which affords excellent facilities for out-door sports and games.

The College buildings are heated by steam and are supplied with water by the town Water Works.

Tuition is free to all students from the State of Delaware, so that the College constitutes a part of our system of free public instruction. She places within reach of the young men of the State a thorough collegiate training with no other cost than that of living and the provision of necessary books and a few inconsiderable fees to cover expenses incurred by the institution. Her work is laid out upon broad lines, and the culture of liberal learning and the practical usefulness of the applied sciences are equally emphasized in her scheme of education. While, in pursuance of the special aims of her organization, stress is laid upon those departments which build up good citizenship and useful manhood, the place so wisely provided in the foundation of the "Land Grant" Colleges is given to the refining graces and amenities of the older learning.

LITERARY SOCIETIES.

Two Literary Societies, each nearly as old as the College, are not only important adjuncts to the social life of the institution but extremely valuable aids in its educational work. The Athenæan and Delta Phi Societies occupy a place midway between the literary societies of some larger colleges and the Greek Letter fraternities now widely extended throughout the college system of the United States. The two societies at Delaware College preserve the useful exercises common to most literary societies,

and at the same time are strongly marked with the spirit of enthusiastic loyalty and brotherhood characteristic of the Greek Letter fraternities. There has never been a time when the Societies did not command the respect of the under-graduates, and it is the uniform testimony of graduates that the Societies stood to them during their course as among the most important and valuable influences of the College. Each Society has a comfortable hall in the old College Building, and each has a well chosen library covering the ground of general literature, history, biography, and popular science.

The Athenæan Literary Society was founded December 18th, 1834, about six months after the opening of the College. The Society's first constitution was adopted in February, 1835, and the Society was incorporated by Act of the Delaware Legislature, dated February 11th, 1881.

The Delta Phi Literary Society, which claims for itself somewhat greater age than its rival, was legally incorporated January 12th, 1835. The Society obtained a new charter from the Legislature of Delaware about 1871, and another in 1895.

So excellent is the influence of these organizations that the Faculty earnestly counsels every student to connect himself early in his course with one or the other.

COURSES OF STUDY.

The following courses of study leading to a degree are offered by the College:

1.—The *Classical Course*, leading to the degree B. A.

2.—The *Latin Scientific Course*, leading to the degree B. A.

3.—The *Agricultural Course*, leading to the degree B. S.

4.—The *General Science Course*, leading to the degree B. S.

5.—The *Civil Engineering Course*, leading to the degree B. C. E.

6.—The *Mechanical Engineering Course*, leading to the degree B. M. E.

7.—The *Electrical Engineering Course*, leading to the degree B. E. E.

There are offered besides, a two years course in Agriculture not leading to a degree, and a short course in Agriculture covering the time of the Winter Term.

In some of the courses a considerable degree of freedom of election of subjects is permitted in the Junior and Senior years,

with the view of enabling students, who have determined upon their life work, so to shape their undergraduate course as best to prepare them for the work of their chosen calling. In the first two years, the courses as prescribed, are believed to meet the needs of most students, but opportunity is given in the Sophomore year of the Classical, Latin Scientific and General Science Courses for a student to strengthen his work in the direction of mathematics, or of language, by permitting the substitution of such studies as he may be prepared to take in lieu of an equivalent group prescribed. Such substitution must be decided upon before the beginning of the year and can be made only with the approval of the Faculty. The very nature of some of the courses, notably those in Engineering, precludes any great amount of elective freedom, but in the Senior years of these courses opportunity is offered for advanced study along special lines. In all of the courses, even in those that lead to immediately practical ends the purely educational side of college life has been distinctly kept in mind. In the assignment of the honors of the graduating class the courses of study are of equal rank.

REQUIREMENTS FOR ADMISSION.

Candidates for admission to the Freshman Class must be at least sixteen years of age.

In all cases they must give satisfactory evidence of good moral character; and, when coming from another institution, they must present a certificate of honorable dismissal.

For entrance to the Course in Agriculture the General Science Course, and the several Engineering Courses, candidates must pass a thorough examination in English, History and Civil Government of the United States, American Literature, Arithmetic, Algebra through Quadratics, and plane Geometry.

Candidates for admission to the Latin Scientific Course must sustain an examination in Latin Grammar and Reader, Cæsar, and Vergil, in addition to the subjects mentioned above.

The requirements for admission to the Classical Course include, besides the foregoing subjects, Greek Grammar, and the first two books of Xenophon's Anabasis.

Examinations are not required of candidates from schools that have courses of study fully covering our entrance requirements, when it is ascertained that the instruction given in such schools

really fits students for undertaking the work of the College. Candidates from schools to which this privilege is granted are required to present a certificate from the Principal, setting forth in detail the nature and extent of the work accomplished.

Partial certificates, in lieu of examinations for entrance, will be accepted in such studies as the candidate has fully completed, as required for admission to the College. Copies of examination papers and note-books, signed by the teacher, should accompany such certificates.

Ability to read at sight easy prose, and a knowledge of the elements of the grammar of either French or German will be required for all Courses except the Classical in the entrance examinations of 1902.

DETAILED EXPLANATION OF THE REQUIREMENTS FOR ADMISSION.

English.

Candidates for matriculation will be expected to show a fair knowledge of technical grammar, and to be able to express themselves in writing with reasonable accuracy as to spelling, punctuation and rhetorical form.

They will be expected to give evidence of acquaintance with Washington Irving's Sketch Book, Edgar Allan Poe's Tales, Nathaniel Hawthorne's Wonder Book, and the best known short poems of William Cullen Bryant, Henry Wadsworth Longfellow, Oliver Wendell Holmes, and John Greenleaf Whittier, together with the chief events in the lives of these authors.

Young men preparing to enter the College are advised, in case they have not access to the complete works of the authors named, to consult some trustworthy bookseller with a view to obtaining in cheap form the masterpieces of American Literature, and those charged with the duty of preparing young men for the College are urged to use, as reading exercises in the advanced classes, selections from the works of the authors named.

United States History.

A good knowledge of the history of our country, such as is to be obtained from the ordinary text-books used in the schools, is required.

Civics.

Candidates must give evidence of elementary knowledge of our Federal institutions.

Arithmetic.

Thorough preparation in arithmetic is necessary for beginning the work of any of the regular courses. Candidates are required to pass an examination upon the whole of higher arithmetic. Great importance is attached to neatness, rapidity and accuracy in the solution of examples. Particular stress is laid upon readiness in dealing with fractions, decimals, percentage and square root. A working knowledge of the Metric System is very desirable.

Algebra.

Thorough facility in elementary operations of algebra, factoring, involution and evolution, square, cube, square and cube root, radicals, fractional and negative exponents, simple and quadratic equations, single and simultaneous, is required. Particular attention should be paid to the algebraic statement of problems, and the algebraic properties of logarithms should be well understood.

Plane Geometry.

A full knowledge of plane geometry and its problems, as given in the usual text books, is required.

After 1901, in addition to the general requirements for admission, under algebra and plane geometry, each student will be required to submit a series of problems in algebra and in geometry, solved by himself under the supervision of his teacher.

Correct constructions and solutions will be neatly entered in a book, each problem signed by the student and countersigned by the teacher. This mathematical laboratory note-book will be submitted with the certificate of proficiency on application for admission.

In all geometric solutions the reason will be given; a mere reference to a numbered proposition will not be sufficient.

It is particularly desired that students become familiar with solutions of literal equations; this avoids many errors which arise in the use of figures and teaches the solution of a whole class of problems at one time.

All students preparing for college, and all teachers having such students, are requested to apply to the President for the circular containing the problems.

Latin.

Cæsar, Gallic War, Books I-IV; Vergil, Aeneid, Books I-VI; Equivalents from other authors will be accepted in part. A thorough knowledge of Latin Grammar, and the ability to translate simple English into Latin are required. The Roman pronunciation is used.

Greek.

Xenophon, Anabasis, Books I-II. A thorough knowledge of Greek Grammar.

ENTRANCE EXAMINATIONS.

Entrance examinations will be held at Newark on Friday and Saturday, June 22d and 23d, 1900, beginning at 9.30 a. m.

On the same dates, examinations will be held at Wilmington, Middletown, Smyrna, Georgetown, Seaford, Laurel, Milford, Dover and Lewes if any candidates shall notify the Secretary of the Faculty of their intention to appear at such places for examination. All applicants must present themselves on the first day named. The examinations will begin at 9.30 o'clock in the morning of each day.

Entrance examinations will be held at the College on Tuesday and Wednesday, September 11th and 12th, 1900.

Candidates desiring to do so can take part of the entrance examination in June and complete it at Newark, September 11th and 12th.

ENTRANCE TO ADVANCED STANDING.

Candidates for entrance to an advanced class in any of the courses are required to sustain examination upon all studies of the course up to the point at which they seek admission.

CHOICE OF STUDIES.

Students may, with the approval of their parents or guardians, enter any one of the departments; or they may take such select studies as they are prepared to pursue when circumstances make it advisable not to enter a regular course. Except in the

case of mature students who may desire to do special work in any department, it is strongly urged that all applicants for admission prepare themselves for undertaking the work of a regular course. Opportunity is offered to students of sufficient maturity and preparation, who do not wish to take any of the regular courses, to pursue special studies determined by some definite end in view.

Changes from one course to another can be made only at the opening of a term, with the approval of the Faculty and the consent of the parent or guardian.

Each student is required to have at least fifteen recitations, or their equivalent, weekly, unless specially excused for cause.

Students in choosing among the elective studies in the Department of the English Language and Literature and Political Science, may, with the approval of the Professor in charge, give to a single subject the total number of recitation periods assigned to the elective studies in any given term offered to such students by the Department.

DEGREES.

Students who have satisfactorily completed the *Classical*, or the *Latin Scientific* Course, are entitled to receive the degree of *Bachelor of Arts;* those who have, in like manner, completed the Course in *Agriculture* or the *General Science* Course are entitled to receive the degree of *Bachelor of Science;* graduates of the *General Science* Course who have given to Modern Language work one third of their time will receive the degree of *Bachelor of Arts;* those who have completed any of the Courses *in Engineering* will receive the degree of *Bachelor of Civil, Mechanical, or Electrical Engineering* according to the course pursued. Every candidate for graduation in any of the courses of study is required, in addition to having pursued successfully the prescribed course, to present before commencement week a satisfactory thesis upon some subject approved by the Faculty. Every candidate for graduation in any of the several Engineering Courses is required to present to the Professor in charge of the course, on or before the first day of May next preceding the candidate's graduation, a carefully prepared written description, accompanied by any necessary drawings, of some structure, machine, or process, which he may have examined.

Any person who has received the degree of Bachelor of Arts, or of Bachelor of Science, at this College or any other institution

whose requirements for these degrees are equivalent to those of Delaware College, may become a candidate for the degree of *Master of Arts* or of *Master of Science*, upon the satisfactory completion of an approved course of study in any department or departments of instruction in this College (any part of which course, shall, if required, be pursued *in residence*), and after the presentation of a thesis giving evidence of scholarly and original work. When these conditions are entirely satisfied, the Faculty shall recommend such candidate to the Board of Trustees for the proper degree.

A graduate of any of the courses in Engineering will, after three years of practical and successful work as an Engineer, be entitled to the professional degree *C. E.*, *M. E.*, or *E. E.*, according to the course he may have pursued. A candidate for any advanced degree in Engineering must present proper evidence of work done in his profession and must submit a satisfactory thesis upon some topic related to his calling.

Copies of all theses submitted for degrees must be left with the College as its property.

ELECTIVE STUDIES.

The work of the Freshman and Sophomore years in all courses is prescribed, save that students of special proficiency and maturity may with the approval of the Faculty begin at the opening of the latter year to specialize with a view to wider election in the Junior and Senior years. In the Junior and Senior years of some courses considerable liberty of election is permitted. Students in the Junior year are required to take twenty periods a week including military drill. In the Junior and Senior years not less than twenty periods will be required in those courses in which the entire amount of work is not prescribed. At the close of the Sophomore year students in such courses will elect, with the approval of the Faculty, sufficient work to make up the required number of recitation periods in the Junior year.

The basis of election must be a proper observance of coherence and sequence of studies. Any general subject begun must be taken at least one year, if it be offered for so long a time, and if a subject is presented for two years, election must extend over that time. The Elective work of the Senior year will naturally be in large part determined by the work elected in the Junior year, and the studies selected must be submitted to the Faculty

for approval at the close of the Junior year. Selection must be made from the list of studies offered for the Senior year, or such others as the Faculty may be willing to add to those offered.

For special and sufficient reasons, a student may at any part of his course substitute studies preparatory to advanced work along a definite line for the studies prescribed in his course, provided the permission of the Faculty and the approval of the Professors concerned are first obtained.

VALUATION OF LABORATORY, WORKSHOP, DRAUGHTING AND COMPOSITION PERIODS.

In work not requiring outside preparation, two and one-half periods are counted as one. The recitation periods in English composition are thus counted, but work involved in themes written outside of class room is counted as one period per week throughout the Freshman and Sophomore years, while the recitation period, plus outside work, counts as one period in the Junior and Senior years.

I. OUTLINE OF THE WORK OF THE CLASSICAL COURSE.

FRESHMAN YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.4	1.4	1.4
American Politics	1.0	1.0	1.0
Elocution	0.4	0.4	0.4
Biology	3.0	3.0	3.0
Mathematics	5.0	5.0	5.0
German or French	2.0	2.0	2.0
Latin	3.0	3.0	3.0
Greek	3.0	3.0	3.0
Military Science and Tactics	1.2	1.2	1.2
	20.0	20.0	20.0

SOPHOMORE YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.4	1.4	1.4
English Literature	2.0	2.0	2.0
Elocution	0.4	0.4	0.4
History of the English Language	1.0	1.0	1.0
History	2.0	2.0	2.0
Chemistry	3.0	3.0	3.0
German or French	2.0	2.0	2.0
Latin	3.0	3.0	3.0
Greek	3.0	3.0	3.0
Military Science and Tactics	1.2	1.2	1.2
	19.0	19.0	19.0

Such students as desire to continue Mathematical work in the Sophomore year may, with the approval of the Faculty, substitute Mathematics (4 periods) for Chemistry and the History of the English Language, or for any group of studies of same time-equivalent as Mathematics. Studies thus deferred may be taken later in the course.

JUNIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.0	1.0	1.0
Elocution	0.4	0.4	0.4
Political Economy and Civil Government	2.0	2.0	2.0
Physics and Physical Laboratory	3.4	3.4	3.4
Chemical Laboratory	1.0	1.0	1.0
Latin	3.0	3.0	3.0
Greek	3.0	3.0	3.0
Military Science and Tactics	1.2	1.2	1.2
	15.0	15.0	15.0
Elective Studies.			
Law	1.0	1.0	1.0
English Literature	2.0	2.0	2.0
Political History	1.0	1.0	1.0
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Spanish	2.0	2.0	2.0
Italian	2.0	2.0	2.0
Greek	2.0	2.0	2.0
Latin	2.0	2.0	2.0
Surveying	1.4	1.4	1.4
Biology	2.0	2.0	2.0

SENIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Elocution	0.4	0.4	0.4
Sanitary Science	1.0	1.0	1.0
Latin	3.0	3.0	3.0
Greek	3.0	3.0	3.0
Ethics	1.0	1.0	1.0
Psychology and Logic	2.0	2.0	2.0
	10.4	10.4	10.4
Elective Studies.			
Natural Theology	1.0	1.0	1.0
Elements of Law and International Law	1.0	1.0	1.0
Comparative Politics	2.0	2.0	2.0
Literature	2.0	2.0	2.0
Spanish	2.0	2.0	2.0
Italian	2.0	2.0	2.0
French	2.0	2.0	2.0
German	2.0	2.0	2.0
Geology	2.0	2.0	1.0
Mineralogy	2.0	2.0	2.0
Chemical Laboratory	1.0	1.0	1.0
Latin	2.0	2.0	2.0
Greek	2.0	2.0	2.0
English Composition	1.0	1.0	2.0
Biology	4.0	4.0	4.0
Mathematics	1.0	1.0	1.0
Astronomy	2.0	2.0	2.0
Evidence of Christianity	1.0	1.0	1.0
Military Science and Tactics	1.2	1.2	1.2

In the Junior and Senior year students are required to select from Elective Studies sufficient work to make the number of periods twenty a week.

II. OUTLINE OF THE LATIN SCIENTIFIC COURSE.

FRESHMAN YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.4	1.4	1.4
American Politics	1.0	1.0	1.0
Elocution	0.4	0.4	0.4
General Biology	3.0	3.0	3.0
Mathematics	5.0	5.0	5.0
Surveying	1.4	1.4	1.4
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Latin	3.0	3.0	3.0
Military Drill	1.2	1.2	1.2
	20.4	20.4	20.4

SOPHOMORE YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.4	1.4	1.4
English Literature	2.0	2.0	2.0
Elocution	0.4	0.4	0.4
History of the English Language	1.0	1.0	1.0
History	2.0	2.0	2.0
Mechanical Drawing	1.0	1.0	1.0
Chemistry	3.0	3.0	3.0
German or French	2.0	2.0	2.0
Latin	3.0	3.0	3.0
Biology	2.0	2.0	2.0
Military Drill	1.2	1.2	1.2
	19.0	19.0	19.0

Students who may desire to continue Mathematics in the Sophomore year, may, with the approval of the Faculty, substitute Mathematics for a group of studies of the same time-equivalent (4 periods) in the Sophomore year.

JUNIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.0	1.0	1.0
Elocution	0.4	0.4	0.4
Political Economy and Civil Government	2.0	2.0	2.0
Physics and Laboratory	3.4	3.4	3.4
Chemical Laboratory	1.0	1.0	1.0
Organic Chemistry	3.0	3.0	3.0
Latin	3.0	3.0	3.0
Biology or Modern Language	2.0	2.0	2.0
Military Drill	1.2	1.2	1.2
	17.0	17.0	17.0
Elective Studies.			
English Literature	2.0	2.0	2.0
Political History	1.0	1.0	1.0
Elements of Law	1.0	1.0	1.0
French	2.0	2.0	2.0
German	2.0	2.0	2.0
Spanish	2.0	2.0	2.0
Italian	2.0	2.0	2.0
Old English (Anglo-Saxon)	1.0	1.0	1.0
Mathematics	3.0	3.0	3.0
Physical Laboratory	3=1.2	3=1.2	3=1.2
Biology	2.0	2.0	2.0
Latin	2.0	2.0	2.0

SENIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Elocution	0.4	0.4	0.4
Psychology and Logic	2.0	2.0	2.0
Geology	2.0	2.0	1.0
Sanitary Science	1.0	1.0	1.0
Mineralogy	2.0	2.0	2.0
Latin	3.0	3.0	3.0
Ethics	1.0	1.0	1.0
	11.4	11.4	10.4
Elective Studies.			
Comparative Politics	2.0	2.0	2.0
English Literature	2.0	2.0	2.0
Composition	1.0	1.0	2.0
Qualitative Analysis	3.0=1.2	3.0=1.2	3.0=1.2
Inorganic Preparations, Assaying, Organic Preparations,	3.0=1.2	3=1.2	3=1.2
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Spanish	2.0	2.0	2.0
Italian	2.0	2.0	2.0
Anglo-Saxon	1.0	1.0	1.0
Constitutional Law	1.0	1.0	1.0
Astronomy	2.0	2.0	2.0
Mathematics	2.0	2.0	2.0
Biology	2.0	2.0	2 0
Latin	2.0	2.0	2.0
Drill	1.2	1.2	1.2

In the Junior and Senior years students must select from Elective Studies sufficient work to make, with the prescribed work, 20 periods a week.

III. OUTLINE OF THE GENERAL SCIENCE COURSE.

FRESHMAN YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.4	1.4	1.4
American Politics	1.0	1.0	1.0
Elocution	0.4	0.4	0.4
General Biology	3.0	3.0	3.0
Mathematics	5.0	5.0	5.0
Surveying	1.4	1.4	1.4
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Shop-work and Drawing	2.4	2.4	2.4
Drill	3=1.2	3=1.2	3=1.2
	19.8	19.8	19.8

SOPHOMORE YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.4	1.4	1.4
English Literature	2.0	2.0	2.0
Elocution	0.4	0.4	0.4
History of the English Language	1.0	1.0	1.0
History	2.0	2.0	2.0
Chemistry	3.0	3.0	3.0
German or French	2.0	2.0	2.0
Biology	2.0	2.0	2.0
Mathematics	4.0	4.0	4.0
Drill	3=1.2	3=1.2	3=1.2
	19.0	19.0	19.0

JUNIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.0	1.0	1.0
Elocution	0.4	0.4	0.4
Political Economy and Civil Government	2.0	2.0	2.0
Physics and Laboratory	3.4	3.4	3.4
Chemical Laboratory	$2\frac{1}{2}$=1.0	$2\frac{1}{2}$=1.0	$2\frac{1}{2}$=1.0
Organic Chemistry	3.0	3.0	3.0
Mathematics	3.0	3.0	3.0
German or French	2.0	2.0	2.0
Biology or Modern Language	2.0	2.0	2.0
Drill	3=1.2	3=1.2	3=1.2
	19.0	19.0	19.0
Elective Studies.			
English Composition	1.0	1.0	1.0
Literature	2 0	2.0	2.0
Physical Laboratory	6=2.4	6=2.4	6=2.4
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Italian	2.0	2.0	2.0
Spanish	2.0	2.0	2.0
Biology	2.0	2.0	2.0
Elements of Law	1.0	1.0	1.0

SENIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Elocution	0.4	0.4	0.4
Geology	2.0	2.0	1.0
Sanitary Science	1.0	1.0	1.0
Mineralogy	2.0	2.0	2.0
Mathematics	2.0	2.0	2.0
Psychology and Logic	2.0	2.0	2.0
	9.4	9.4	8.4
Elective Studies.			
Composition	1.0	1.0	2.0
Natural Theology	1.0	1.0	1.0
Ethics	1.0	1.0	1.0
Elements of Law	1.0	1.0	1.0
International Law	1.0	1.0	1.0
Comparative Politics	2.0	2.0	2.0
Literature	2.0	2.0	2.0
Spanish	2.0	2.0	2.0
Italian	2.0	2.0	2.0
French	2.0	2.0	2.0
German	2.0	2.0	2.0
Chemical Laboratory	1.2	1.2	1.2
Biology	4.0	4.0	4.0
Mathematics	2.0	2.0	2.0
Astronomy	2.0	2.0	2.0
Inorganic Preparations, Assaying, Organic Preparations,	3=1.2	3=1.2	3=1.2
Drill	3=1.2	3=1.2	3=1.2

Students are required to select sufficient work from Elective Studies in the Junior and Senior years to bring their periods of work up to twenty a week.

IV. OUTLINE OF THE AGRICULTURAL COURSE.

FRESHMAN YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.4	1.4	1.4
American Politics	1.0	1 0	1.0
Elocution	0.4	0.4	0.4
General Biology	3.0	3.0	3.0
Mathematics	5.0	5.0	5.0
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Surveying	1.4	1.4	1.4
Shop-work	2.4	2.4	2.4
Military Drill	1.2	1.2	1.2
	19.8	19.8	19.8

SOPHOMORE YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.4	1.4	1.4
English Literature	2.0	2.0	2.0
Elocution	0.4	0.4	0.4
History of the English Language	1.0	1.0	1.0
History	2.0	2.0	2.0
Chemistry	3.0	3.0	3.0
German	2.0	2.0	2.0
French	2.0	2.0	2.0
Botany	2.0	2.0	2.0
Agriculture	2.0	2.0	2.0
Military Drill	1.2	1.2	1.2
	19.0	19.0	19.0

JUNIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.0	1.0	1.0
Elocution	0.4	0.4	0.4
German or French	2.0	2.0	2.0
Physics and Laboratory	3.4	3.4	3.4
Chemical Laboratory	1.0	1.0	1.0
Organic Chemistry	3.0	3.0	3.0
Zoölogy	2.0	2.0	2.0
Agriculture	5.0	. . . .	5.0
Horticulture	. . . .	3.0	. . . .
Entomology	. . . .	2.0	. . . .
Military Drill	1.2	1.2	1.2
	19.0	19.0	19.0

SENIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Elocution	0.4	0.4	0.4
Geology	2.0	2.0	1.0
Sanitary Science	1.0	1.0	1.0
Mineralogy	2.0	2.0	2.0
Agriculture	5.0	. . . .	5.0
Veterinary Science	. . . .	3.0	. . . .
Plant Diseases	. . . .	2.0	. . . .
Psychology or Logic	2.0	2.0	. . . .
	12.4	12.4	11.4
Elective Studies.			
Astronomy	2.0	2.0	2.0
Political Economy and Civil Government	2.0	2.0	2.0
Qualitative Analysis	3.0	3.0	3.0
Inorganic Preparations, Assaying / Organic Preparations	3.0=1.2	3.0=1.2	3.0=1.2
English Composition	1.0	1.0	2.0
French	2.0	2.0	2.0
German	2.0	2.0	2.0
Vertebrate Dissection	2.0	2.0	2.0
Advanced Botany	2.0	2.0	2.0

In the Junior and Senior years students are required to select from the Elective Studies sufficient work to bring the number of periods of work up to twenty a week.

SHORTER COURSE IN AGRICULTURE.

First Year.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.4	1.4	1.4
Surveying	1.4	1.4	1.4
Biology	3.0	3.0	3.0
Botany	2.0	2.0	2.0
Inorganic Chemistry	3.0	3.0	3.0
Farm Crops and Soils	4.0		
Entomology		3.0	
Horticulture		2.0	
Breeds and Breeding of Live Stock			4.0
Shop-work	2.4	2.4	2.4
	17.2	18.2	17.2

Second Year.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.4	1.4	1.4
Physics and Laboratory	3.4	3.4	3.4
Chemistry (Organic)	3.0	3.0	3.0
Chemical Laboratory	1.0	1.0	1.0
Zoölogy	2.0	2.0	2.0
Fertilizers	5.0		
Plant Diseases		2.0	
Veterinary Science		3.0	
Stock Feeding			5.0
Dairying		1.0	
Shop-work	2.0	2.0	2.0
Advanced Botany	2.0	2.0	2.0
	19.8	20.8	19.8

V. OUTLINE OF COURSE IN CIVIL ENGINEERING.

FRESHMAN YEAR.

Notes.

A full description of the Course begins on page 55, under Methods of Instruction. Opportunity is offered for election of a portion of the work in the Senior year. Each student must elect, in each term, one of the recommended technical electives or equivalent technical work.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.0	1.0	1.0
	2=0.8	0.8	0.8
Elocution	1=0.4	0.4	0.4
American Politics	1.0	1.0	1.0
German or French	2.0	2.0	2.0
Mathematics	5.0	5.0	5.0
Surveying	1.0	1.0	1.0
	1=0.4	0.4	0.4
Steam Engines and Steam Boilers	2.0	2.0	. . . .
Descriptive Geometry	. . . .	. . . .	2.0
Mechanical Drawing	6=2.4	2.4	2.4
Shop-work	6=2.4	2.4	2.4
Military Science and Tactics	3=1.2	1.2	1.2
	19.6	19.6	19.6

SOPHOMORE YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.0	1.0	1.0
	2=0.8	0.8	0.8
Elocution	1=0.4	0.4	0.4
German or French	2.0	2.0	2.0
Mathematics	4.0	4.0	4.0
Physics	3.0	3.0	3.0
Chemistry	3.0	3.0	3.0
Surveying	1.0	1.0	1.0
	. . .	1=0.4	. . . .
Physical Laboratory	3=1.2	1.2	1.2
Field-work and Plotting	3=1.2	2=0.8	3=1.2
Mechanical Drawing	3=1.2	1.2	1.2
Military Science and Tactics	3=1.2	1.2	1.2
	20.0	20.0	20.0

JUNIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Elocution	1=0.4	0.4	0.4
German or French	2.0	2.0	2.0
Mathematics	3.0	3.0	3.0
Mechanics	5.0	5.0	5.0
Graphic Statics	2=0.8	0.8	0.8
Mineralogy	2.0	2.0	2.0
Surveying	2.0	2.0	2.0
Chemical Laboratory	$2\frac{1}{2}$=1.0	1.0	1.0
Field-work in Surveying	3=1.2	. . . .	1.2
Topographical Drawing	. . . .	3=1.2	. . . .
Free-hand and Mechanical Drawing	3=1.2	1.2	1.2
Military Science and Tactics	3=1.2	1.2	1.2
	19.8	19.8	19.8

SENIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Elocution	1=0.4	0.4	0.4
Hydromechanics	2.0	3.0	3.0
Geology	2.0	2.0	1.0
Sanitary Science	1.0	1.0	1.0
Strength of Materials	3.0	4.0	. . . .
Highway Engineering	. . . .	. . . .	2.0
Roofs and Bridges	2.0 3=1.2	2.0 1.2	. . . .
Building Construction	2.0	. . . .	. . . .
Masonry Construction	. . . .	1.0	3.0
Contracts and Specifications	. . . .	. . . .	3.0
Thesis	2=0.8	0.8	. . . .
Drawing	2=0.8	0.8	0.8
Engineering Laboratory	. . . .	4=1.6	. . . .
Field-work or Laboratory	4=1.6	. . . .	3=1.2
	16.8	17.8	15.4
Elective Subjects.			
Railroad Engineering	3.0	2.0	4.0
Bridge Engineering	. . . .	2.0	4.0
Materials of Construction	3.0	2.0	4.0
Building Construction	. . . .	2.0	4.0
Water Supply	3.0	2.0	4.0
Sewerage	3.0	2.0	4.0
Hydraulics	. . . .	2.0	4.0
Pumps and Hydraulic Motors	. . . .	. . . .	3.0
Applied Electricity	. . . .	. . . .	5.0
Theory of Electricity	. . . .	. . . .	3.0

VI and VII. OUTLINE OF COURSES IN MECHANICAL AND ELECTRICAL ENGINEERING.

Opportunity is offered for election in a portion of the work of the Senior year. A full description of the courses of study will be found under the proper heads. Each student in his Senior year must select from the Elective Studies or some other subjects taught in the College, sufficient studies to bring his work up to the required number of periods per week.

FRESHMAN YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.0 2=0.8	1.0 2=0.8	1.0 2=0.8
Elocution	1=0.4	1=0.4	1=0.4
American Politics	1.0	1.0	1.0
German or French	2.0	2.0	2.0
Mathematics	5.0	5.0	5.0
Surveying	1.0 1=0.4	1.0 1=0.4	1.0 1=0.4
Steam Engines and Boilers	2.0	2.0	. . . .
Descriptive Geometry	. . . .	. . . .	2.0
Mechanical Drawing	6=2.4	6=2.4	6=2.4
Shop-work	6=2.4	6=2.4	6=2.4
Military Science and Tactics	3=1.2	3=1.2	3=1.2
	19.6	19.6	19.6

SOPHOMORE YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
English Composition	1.0 2=0.8	1.0 2=0.8	1.0 2=0.8
Elocution	1=0.4	1=0.4	1=0.4
German or French	2.0	2.0	2.0
Mathematics	4.0	4.0	4.0
Physics	3.0	3.0	3.0
Chemistry	3.0	3.0	3.0
Physical Laboratory	6=2.4	6=2.4	6=2.4
Mechanical Drawing	3=1.2	3=1.2	3=1.2
Shop-work	3=1.2	3=1.2	3=1.2
Military Science and Tactics	3=1.2	3=1.2	3=1.2
	20.2	20.2	20.2

JUNIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Elocution	1=0.4	1=0.4	1=0.4
German or French	2.0	2.0	2.0
Mathematics	3.0	3.0	3.0
Mechanics of Solids	5.0	5.0	5.0
Chemical Laboratory	2½=1.0	2½=1.0	. . . .
Kinematics	3.0	3.0	. . . .
Graphical Statics	. . . .	. . . .	3.0
Valve Gears	2.0	2.0	. . . .
Electricity	. . . .	. . . .	3.0
Drawing	3=1.2	3=1.2	3=1.2
Shop-work	3=1.2	3=1.2	3=1.2
Military Science and Tactics	3=1.2	3=1.2	3=1.2
	20.0	20.0	20.0

MECHANICAL ENGINEERING.—SENIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Elocution	1=0.4	1=0.4	1=0.4
Hydromechanics	2.0	3.0	3.0
Strength of Materials	3.0	4.0	. . . .
Roofs and Bridges	2.0 3=1.2	. . . .	. . . .
Contracts and Specifications	. . . .	. . . .	3.0
Thermodynamics	4.0	. . . .	. . . .
Steam Engine Design	3.0	3.0	. . . .
Machine Design	3=2.0	3=2.0	3=2.0
Steam Boilers	. . . .	3.0	3.0
Pumps and Hydraulic Motors	. . . .	. . . .	3.0
Transmission and Measurement of Power	. . .	. . . .	3=2.0
Thesis	. . . .	3=1.2	. . . .
Shop-work and Mechanical Laboratory	6=2.4	6=2.4	6=2.4
	20.0	19.0	18.8

ELECTRICAL ENGINEERING.—SENIOR YEAR.

Subjects.	Periods per Week.		
	1st Term.	2d Term.	3d Term.
Elocution	1=0.4	1=0.4	1=0.4
Hydromechanics	2.0	3.0	3.0
Contracts and Specifications	. . . .	. . . .	3.0
Thermodynamics	4.0	. . . .	. . . .
Steam Engine Design	3.0	. . . .	. . . .
Machine Design	3=2.0	3=2.0	3=2.0
Steam Boilers	. . . .	3.0	. . . .
Pumps and Hydraulic Motors	. . . .	. . . .	3.0
Electrical Measurements	1.0	2.0	. . . .
Electrical Machinery	4.0	3.0	. . . .
Applied Electricity	. . . .	. . . .	5.0
Thesis	. . . .	3=1.2	. . . .
Electrical and Mechanical Laboratory	6=2.4	6=2.4	6=2.4
	18.8	17.0	18.8
Elective Studies.			
Military Science and Tactics	3=1.2	3=1.2	3=1.2
Railroad Engineering	3.0	2.0	4.0
Bridges	. . . .	2.0	4.0
Building Construction	2.0	2.0	4.0
Water Supply	. . . .	2.0	4.0
Astronomy	2.0	2.0	2.0
Advanced Mathematics	2.0	2.0	2.0
Materials of Construction	. . . .	2.0	4.0

METHODS OF INSTRUCTION.

What follows under this head is in part a detailed expansion of the matter tabulated in the immediately preceding pages, and in part a presentation of aims and methods.

ENGLISH LANGUAGE AND LITERATURE.

Nearly all the work in this department is elective after the Sophomore year. The instruction is partly by text book and partly by lectures. In the case of Literature, both of these are subordinated to the reading of the great masters, British and American. The object aimed at during the required course in Literature is to cultivate a taste for the best reading rather than to cumber the memory with names, dates and mere biographical details.

The optional course in literature is devoted to the study of the great masters and of the history and philosophy of literature.

A library chosen especially with a view to the needs of students in literature is an important adjunct to the study, or perhaps it would be more nearly true to say that the class room is made an adjunct and introduction to the library.

The following courses will be presented in the English Language and Literature during the year 1900–1901 :

SOPHOMORE YEAR.

Reading of masters in American Literature; Franklin, Jefferson, Hamilton, Cooper, Irving, Bryant, Poe, Longfellow, Holmes, Whittier, Emerson, Thoreau, Whitman, and the chief living writers. Reading of British Masters, from Chaucer to the men of the present day, with Brooke's Primer of English Literature as an adjunct. History of the English Language once a week.

JUNIOR YEAR.

Work purely elective. Full term given to reading and study of Shakespeare. Like treatment of other masters, with critical readings and brief lectures. Lectures on development of the English sonnet, essay, drama, and novel, with copious illustrative reading from the authors discussed, and special studies of influence and tendencies.

SENIOR YEAR.

Work of the preceding year continued, with special attention to influences and tendencies as shown in the development of English Literature.

ENGLISH COMPOSITION.

FRESHMAN YEAR.

Lectures on Theory of Composition, with special reference to clearness of arrangement and expression. Themes written in class. Themes written out of class fortnightly. Class work once a week for all but Engineers; twice a week for Engineers.

SOPHOMORE YEAR.

Lectures on Theory of Composition, with special reference to clearness, force and ease. Themes as in the Freshman year. Class work as in the Freshman year.

JUNIOR YEAR.

Special study of prose style in masters, British and American. General Review of Theory of Composition in Third Term. Themes written in class. Themes written out of class once in three weeks. Class work once a week.

SENIOR YEAR.

Elective: Lectures and class exercises directed toward a critical study of style with special reference to ease. Once a week first and second terms; twice a week third term. Themes once a month written out of class.

POLITICAL SCIENCE.

The effort has been made to provide a consistent and well-developed course in Political Science, including History, Civil Government, Political Economy, and Comparative Politics. In all of these subjects the library is regarded as the student's laboratory.

This work is scheduled thus for the year 1900–1901:

FRESHMAN YEAR.

History of American Politics, by lectures or text book once a week throughout the year, with collateral reading.

SOPHOMORE YEAR.

Political History of Europe in XIX Century. Lectures twice a week throughout the year with collateral reading suggested.

JUNIOR YEAR.

American Civil Government. Twice a week during first term. Bryce's American Commonwealth, abridged, with collateral reading. Political Economy. Twice a week, second and third terms. Bullock's Introduction to the Science of Economics. Collateral reading.

SENIOR YEAR.

Elective: Comparative Politics. Lectures discussing forms of government in Europe and America as compared with our own system. Twice a week. Collateral reading.

PSYCHOLOGY, ETHICS, LOGIC AND LAW.

Psychology is a required study of the Senior year. A text book is used, and the object is to give the student as clear a conception of modern physiological psychology as can be obtained without the apparatus of a psychological laboratory, and at the same time to call attention to the earlier psychological system, as taught for example, in the works of Sir William Hamilton. The general library of the College has a small, but excellent division of psychology, representing the earlier and later schools.

The study of ethics is required in the Senior year, and recitations are given once a week during the three terms. The subject is considered both theoretically and practically. Its relations to psychology and civil government are pointed out and emphasized. Books of reference are cited and students are encouraged to read works bearing upon the subject.

Lectures on the elements of law are given to such of the Senior class as desire it, and for the members of the Senior class in civil engineering there is a special course of lectures on the law of contracts.

The study of International Law is elective in the Senior year. To such as take it the present status of the law is briefly, but clearly explained.

The study of logic is required of all the students in the Senior class except those who are in the engineering courses. A text book is used and examples and illustrations are freely given to test the knowledge of the class. The aim is to make the subject useful both in its practical application and as a discipline for the mind.

ELOCUTION AND ALLIED STUDIES.

The object is to make elocution not merely an exercise in vocal gymnastics, but a study related on the one side to literature, on the other to politics. To this end the student is impressed with the idea that no cleverness in mere dramatic elocution can make up for poverty of thought or deficiency in critical insight.

Instruction is given to the freshmen in the principles of reading, articulation, pronunciation, emphasis and expression. Care is taken to eradicate, as far as possible, natural defects, to correct bad habits and to induce an easy and agreeable utterance. The members of the class are taught to look carefully for the meaning of words, sentences and paragraphs, and to bear constantly in mind the subject considered. During the third term of the Freshman year the class is required to read some portion of the English classics.

In the Sophomore year reading is continued during the first term and practice given in declamation ; short selections are memorized. During the second and third terms attention is given to voice culture and gesticulation.

The members of the Junior class are instructed in the reading and recitation of original essays and orations.

Original orations are required of the Senior class, and debates on some of the leading questions of the day, and practice given in parliamentary law. The class is taught the logical order of conducting a debate, and criticisms are made in regard to both matter and manner.

Individual instruction is, also, given to the members of the Sophomore, Junior and Senior classes.

LAW.

The study of the elements of law is elective in the Junior and Senior years. Instruction will be given by lectures showing the growth and progress of municipal law, outlining the leading principles and illustrating by reference to judicial decisions in important cases. During a portion of the Senior year the class will be made acquainted with ordinary business forms and offered some practice in the use of them.

International Law, which with the increase of our commerce and the consequent extension of our foreign relations, is every year becoming more important and interesting, will be open as a

study to all the members of the Senior class who desire to pursue it. The present status of this branch of the law will be explained and the most recent decisions and treatises will be referred to.

MODERN LANGUAGES AND LITERATURES.

French and German are among the required subjects of study, and Spanish and Italian are offered to such as wish to elect them. As may be seen in detail on page 42 four years work in French, four years work in German, and one year each of Spanish and Italian are offered. With the approval of the Faculty, any year or years of this work may be elected by any student in addition to the amount required in his course.

Extra modern language, practically amounting to a course in modern languages, to be directed by the professor in charge and for which credit will be duly given, may be taken by all but technical students. This extra work raises both German and French to three period subjects in the second, third and fourth years.

The work is so conducted as to give all an opportunity to learn to read the modern languages readily; to understand them when heard; to write them correctly, and so to be able to learn easily to speak them, if necessity arises: but the main object is to inspire such a love for the literatures and languages, as will be a source of pleasure and of intellectual growth. Lectures are occasionally given in English, French or German.

The master pieces in the literatures of these languages are being collected. The Kürschner collection of German National Literature (222 volumes) has just been received; and the Hachette collection of the Great Writers of France is expected in time for the work of the fall of 1900.

Advanced methods of work are being adopted, as fast as the time at command and the resources of the library will permit.

The publications of the Société des Anciens Textes Français, Godefroy's Old French Dictionary, Romania, Zeitschrift für Romanische Philologie, Beiträge zur Geschichte der Deutschen Sprache und Literatur, Goethe-Jahrbuch, The Journal of Germanic Philology, Modern Language Notes and other helps are now in the library. The work in Old German and Old French especially will be made to throw light on the English language and literature, as indeed all the work in the modern languages is intended to do.

The following courses will be offered in 1900-1901.

FRENCH.

1. Beginning French. Grammar (Whitney.) Easy reading in modern French. Twice a week.
2. The Romantic School. Crane's Romantisme Français. Hugo's Hernani. Grammar continued. Twice a week.
3. The French Classics. Molière, Corneille, Racine. Course conducted largely in French. Writing French. Twice a week.
4. History of French Literature, with readings in Montaigne, Rabelais, etc. Course conducted chiefly in French. Old French (Aucassin and Nicolette.) Twice a week.

SPANISH.

5* Grammar (Manning.) Easy reading in modern Spanish. Twice a week.

ITALIAN.

6* Grammar (Manning.) Easy reading in modern Italian. Twice a week.

GERMAN.

1. Beginning German. Grammar (Joynes-Meissner.) Easy reading in modern German. Twice a week.
2. Schiller's William Tell. Lessing's Minna von Barnhelm. Goethe's Hermann and Dorothea. Grammar continued. Twice a week.
3. Goethe's Faust (Parts I. and II.) Course conducted largely in German. Writing German. Twice a week.
4. History of the German Literature. Course conducted chiefly in German. Selections from Middle High German writers.

ANCIENT LANGUAGES AND LITERATURES.

FRESHMAN YEAR.

LATIN.—Cicero, Select Orations. Ovid, Metamorphoses, etc. Prose composition. Three times a week.

GREEK.—Anabasis, finished. Prose composition and grammatical drill. Three times a week.

*It is not certain that both of these Courses can be given in 1900-1901.

SOPHOMORE YEAR.

LATIN.—Livy, 21st or 22d book. Cicero, De Senectute or De Amicitia. Prose composition. Three times a week.

GREEK.—Homer, Iliad, Books I-III. Herodotus, Book VIII. Three times a week.

JUNIOR YEAR.

LATIN.—Horace, Odes, Epodes, Satires and Epistles. Tacitus, Germania and Agricola. Reading at sight. Three times a week.

GREEK.—Xenophon, Memorabilia. Plato, Phaedo. Homer, Odyssey. Three times a week.

SENIOR YEAR.

LATIN.—Juvenal, Satires; or Horace, Ars Poetica. Seneca, Moral Essays; or Quintilian, Book X. Reading at sight. Three times a week.

GREEK.—Aristophanes, Clouds or Plutus. Aeschylus, Prometheus Bound, or Sophocles, Antigone. Three times a week.

ELECTIVE COURSES.

Open to Seniors, Juniors and Graduates.

LATIN I.—Early Latin. Plautus or Terence, Comedies. History of Latin Literature. Lectures. Twice a week.

II.—The Literature of the Empire. Selections from representative authors. Twice a week.

GREEK I.—Greek Tragedy. The plays of Aeschylus, Sophocles, and Prometheus. History of Greek Literature. Lectures. Twice a week.

II.—Greek Testament. Twice a week.

These elective courses are offered in alternate years and are especially recommended to those who intend to teach.

In addition to the required work in Latin and Greek, elective courses are now offered to advanced students, thus enabling those who so desire, to take sixteen periods of work in each of these languages, instead of fourteen, as heretofore. Throughout the course the aim is to enable the student to acquire facility and quickness in reading at sight and familiarity with the ancient order of thought. Word-meaning is fixed by inspecting form, derivation, and comparing with synonymes. The authors are selected with a view to their representative character. The public

and private life of the Greeks and Romans and their influence on modern literature and civilization are continually kept before the minds of the students. English derivatives and words kindred to all Indo-European tongues are frequently noted, and the general principles of comparative philology are explained and applied.

MATHEMATICS.

Five periods of pure Mathematics are required in all courses in the Freshman year. Two periods in General Surveying are required in all, except the Classical Course, in the same year. All courses, except the General Science and the Engineering Courses, discontinue Mathematics after the first year. Students may continue Mathematics after the Freshman year, in lieu of certain other studies, if they so desire, provided they meet the requirements and receive the approval of the Faculty.

FRESHMAN YEAR.—Plane Trigonometry and problems. *Crockett.*

Solid Geometry; Problems in Plane and Solid Geometry. *Gore.*

Elements of Analytic Geometry and Calculus. *Young and Linebarger.*

Surveying; Use of instruments, particularly the chain, compass and level, with applications. *Davies.*

SOPHOMORE YEAR.—Spherical Trigonometry and Problems. *Crockett.*

Problems in Calculus and Analytic Geometry continue throughout the year.

Theory of Equations; particular attention to Numerical Cubics. *Taylor.*

General Equation of Conics, Higher Plane Curves and Solid Analytic Geometry. *Tanner and Allen.*

Calculus. *Young and Linebarger.*

JUNIOR YEAR.—Applications of Calculus to Analytic Geometry and Mechanics, Differential Equations. *McMahon and Snyder; Murray.*

Problems from various text-books and treatises.

SENIOR YEAR.—General Astronomy. *Young.*

Such other work in Calculus, Trigonometry, etc., as the professor may consider necessary to problems under discussion.

When necessary, lectures in physics will be given to illustrate the laws expressed in the formulæ and to impress the student with the usefulness as well as the beauty of Mathematics.

Properly prepared students who wish to pursue advanced Mathematics may take suitable work in Determinants, Method of Least Squares, Advanced Differential Equations, Theory of Functions, etc.

The department library contains a fine collection of standard treatises on all lines of mathematical inquiry. Mathematical Journals are on file. Advanced students are encouraged to use the library.

PHYSICS.

Physics forms a part of the required work of all the regular courses of study. Three periods a week are given to recitations in this subject throughout the Junior year in all courses, except those in Engineering. An additional period a week is required for demonstrations to explain the text and illustrate the lectures more fully than can be done in the regular recitation periods. Much of this work is qualitative in character, but all students have frequent quantitative exercises. In the Engineering Courses, the study of Physics is begun in the Sophomore year. Three periods a week are required in recitations and lectures, three periods of laboratory work are required of the Civil Engineers, and six periods a week in physical laboratory are given in the Mechanical and Electrical Engineering Courses. The laboratory courses, thus provided, are open to all students who may desire to take them. In the arrangement of the work in Physics the wants of those who are pursuing the study as part of their preparation for other sciences, in particular medicine and engineering, as well as of those who simply take physics as an indispensable part of a course of liberal education are carefully considered.

Physical Laboratory—Throughout the year. This work is given with three objects in view: 1st, to give the student facility in the use of instruments and knowledge of the theory of their construction and adjustment; 2d, to give a clearer preception of the principles of physics than can be secured by any other method, and 3d, to give practice in those experimental lines that will be most helpful in later engineering work.

These objects are secured by requiring *all* students taking this work to make numerous accurate physical measurements involving mass, length, and time, thus acquiring manipulative skill; and then by requiring the determination of various physical constants and the repetition of certain classical experiments. After this, the work differentiates to a certain extent, each student following the line of experimental work that will be of the most service to him.

This experimental work is accompanied by instruction in methods of manipulation and great stress is laid on the discussion of results, students being required to state concisely, a description of the experiments, the results that follow, and the reasons for these results and the deductions from them.

The equipment of apparatus for this work is very good; including, as it does, nearly all of the demonstration apparatus used in connection with the text-book work in physics. Additions will be made to this as shall be required to keep abreast of the times.

The department library is well supplied with reference laboratory manuals that can be used to advantage when comparison or selection of methods is desired.

The library of the department contains a large collection of standard reference books covering all lines of physical inquiry. The journal list is large, and includes the leading English, French and German journals of physics and allied sciences. The library is open to the students at all times during the working hours of the College.

CHEMISTRY, MINERALOGY, GEOLOGY AND SANITARY SCIENCE.

CHEMISTRY.—Instruction is given in Pure and Applied Chemistry by lectures, recitations, and laboratory practice. This course extends through the Sophomore, the Junior, and the Senior year, and embraces the elements of Inorganic and Organic Chemistry. Students, after making themselves familiar with the details of experiments, are required to repeat the same in the laboratory.

The chemical laboratory is open daily for instruction in analytical chemistry.

The course of instruction in qualitative analysis will include the examination of simple and complex substances in the wet way,

their analysis by the use of the blow-pipe and flame reactions, and the determination of minerals with the blow-pipe.

Students are required to keep a careful record of their work, and to submit the same to the inspection of the professor. Upon passing satisfactory examination in qualitative analysis, students may, if they so desire, take up quantitative analysis.

The course of instruction in quantitative analysis will embrace the gravimetric analysis of simple and complex salts, minerals, ashes of plants, fertilizers, waters, etc.; volumetric analysis, including acidimetry, alkalimetry, chlorimetry, etc.; organic analysis; gas analysis and the preparation of inorganic and organic compounds.

Students desiring to take a post-graduate course will find excellent opportunities for pursuing their studies.

In order to make the instruction thoroughly practical, lectures upon the leading chemical and metallurgical industries will be given throughout the entire course. During the sessions visits will be made to some of the great manufacturing establishments in which chemical and metallurgical operations are carried on. Students will thus have most valuable opportunities of gaining a practical aquaintance with some important branches of applied science.

The library of the department is well supplied with the standard works of reference, and the leading American and foreign journals are on file and at all times accessible to the students.

Assaying.—The assay laboratory is kept in full working order, completely furnished with crucible, scorification and cupelling furnaces, and everything for practical work in the assay of ores of lead, silver, gold, etc. The general principles as well as special methods of assaying are explained in the lecture room, and at the same time ores of the various metals are exhibited and described. From a collection of these ores from various parts of the country, the students are required to make a number of assays under the immediate supervision of the professor.

Mineralogy.—The Course of instruction in Mineralogy extends throughout the Senior year. The first term is usually occupied with the discussion of the *physical properties* of minerals, including their morphological properties (Crystallography), their optical properties, hardness, specific gravity, etc. The second and the third terms are devoted to Descriptive Mineralogy. Students also receive practical instruction in Determinative Mineralogy.

GEOLOGY.—The work in this department comprises recitations and lectures upon General Geology throughout three terms of the Senior year. The student is first taught the principles of Lithology and of Microscopic Petrography. For this work the college has provided itself with the best petrographical microscopes and sets of hand specimens and thin sections of the typical rocks. The study of Structural and Dynamical Geology occupies the second and third terms of the Senior year, when the student is taught the arrangement of rock masses, and the agencies concerned in their upheaval, erosion and metamorphism.

SANITARY SCIENCE.—The instruction in this important study is thoroughly practical, and embraces recitations and lectures on the following subjects: Water, Air, and Food; Disposal and Utilization of Sewage; Origin and Spread of Epidemics; Disinfectants and their uses; Ventilation and Warming; Vital statistics, etc.

SUBJECTS OF INSTRUCTIONS.

SOPHOMORE YEAR.

Inorganic Chemistry.—The course includes a detailed study of the chemical and physical properties and industrial uses of the metalloids and the metals and their more important compounds. Recitations and lectures. Text-book, *Wurtz's Elements of Chemistry.*

JUNIOR YEAR.

Organic Chemistry.—The instruction is directed mainly to the preparation and general characteristics of the more important carbon compounds. Recitations and lectures. Text-book, *Wurtz's Elements of Chemistry.*

Qualitative Analysis.—The work of this course includes the preparation of the more important non-metallic elements and their compounds; a study of the bases and acids, their detection and separation. Laboratory practice and lectures. Text-book, *Thorpe and Muir's Qualitative Analysis and Laboratory Practice.*

SENIOR YEAR.

Mineralogy.—The work embraces the morphological, physical and chemical characters of minerals, their occurrence and distribution. Recitations and laboratory practice. Text-book, *Dana's Minerals and How to Study Them.*

Geology.—The instruction embraces dynamical, structural, physiographical, and historical geology. Recitations and lectures. Text-book, *Scott's Introduction to Geology.*

Sanitary Science.—The work consists in a detailed discussion of all matters relating to public health. Recitations and lectures. Text-book, *Wilson's hand-book of Hygiene and Sanitary Science.*

ELECTIVES.

The following Electives are offered in the Senior year to students pursuing the Latin Scientific and General Science Courses.

Qualitative Analysis.—A continuation of course begun in the Junior year. Three periods.

Inorganic Preparations.—The preparation of inorganic salts. Text-book, *Lengfeld's Inorganic Preparations.* Three periods First Term.

Assaying.—Assays of gold, silver, and lead ores. Text-book, *Rickett's Notes on Assaying.* Three hours Second Term.

Organic Preparations.—The preparation of some of the more important organic compounds. Text-book, *Fisher Darstellung Organisher Präparate.* Three periods Third Term.

BIOLOGY.

The aim of biological instruction is to give the student some knowledge of the various living things by which he is surrounded and the relation which man bears to them economically, biologically and morally, as well as to develop habits of careful observation and comparison, and close and accurate methods of thinking.

Most of the time is spent in actual study in the laboratory, which is supplied with tables, microscopes and re-agents, as well as with illustrative specimens and charts.

Material for dissection is supplied by the college, although the students are encouraged to collect as much as possible. The required work in biology may be finished with the Sophomore year, but to provide for the continuation of the work by those who desire to pursue its study further, elective work is offered in the Junior and Senior years.

Those students who expect to become farmers, physicians or naturalists, or who have a decided liking for Natural History studies, will thus have opportunity to continue their work in a

line directly in accord with their tastes and future occupation in life and, at the same time, obtain the mental drill which is the chief object of a college training.

Elective work in either Botany or Zoölogy may be arranged to suit the taste, capacity and fitness of the student desiring it, and will consist mostly of laboratory work in Botany and Vertebrate Zoölogy.

1. **Elementary Biology.**—An introduction to the study of living things upon the basis of morphology and physiology.

Types of animals and plants will be studied in the laboratory and this work supplemented by a text book. This work is required of students in all courses except those in Engineering. Three hours a week throughout the Freshman year.

2. **Elementary Botany.**—Laboratory work upon the morphology, structure, histology and life histories of plants, supplemented by text book, lectures and field excursions.

Selected types illustrating the larger groups of plants are examined, but the major part of the time will be spent upon the flowering plants. This course is an alternative with the course in Elementary Zoölogy and is intended to follow the course in Elementary Biology, but may be taken without that.

Two hours a week during the Sophomore year.

3. **Elementary Zoölogy.**—Laboratory work upon selected types representing the principal groups of animals from Mammals to Protozoans, supplemented by text-book. The course is intended to give a comprehensive view of the variations in structure and life history of the different classes of animals.

Alternative with the course in Elementary Botany. Two hours a week during the Sophomore year.

Should a student desire, he may be able to take both this and course 2.

4. **Advanced Botany.**—Upon the completion of course 2, advanced work may be arranged for, in Physiological or Cryptogamic Botany, or in such other lines of botanical work as the student may be fitted for and wish to pursue. In general this work is open to Juniors or Seniors.

5. **Zoölogy—Vertebrate Dissection.**—To follow course 3, but may be taken without that if a student is prepared for the work. A more thorough study of one or two types such as the cat and frog, intended to give an acquaintance with the structural details of a vertebrate animal and particularly intended as an introduction to human anatomy and physiology. Elective.

This course is especially useful to students who expect to study medicine upon leaving college.

6. **Zoölogy.**—Courses in the Principles of Zoölogy, in Normal Histology and in Embryology will be arranged at the discretion of the instructor for such students as elect Biology in the latter years of their course. These courses are all dependent upon the completion of a certain amount of elementary work, such as is indicated in courses 1, 2 and 3.

AGRICULTURE.

The object of the course in this department is to fit young men, who have a taste for science and agriculture, understandingly to manage farms or to become workers in Experiment Stations or in other situations where there is necessary a knowledge of the sciences in their application to agriculture.

Only the broadly trained man can become a successful specialist; therefore it will be seen by reference to the detailed schedule of the course on page 29, that it includes a certain amount of study in English, Economics, History, Mathematics and Language; subjects which by common consent are embraced in the training and equipment of every well educated man.

In order that the student may get the most good from his technical studies, most of that work is done in the last two years of the course after a good foundation has been laid by the study of the Natural Sciences, the application of which to practice, constitutes Agricultural Science.

For description of courses and methods of instruction in branches common to other courses, see the appropriate headings.

FRESHMAN YEAR.

In this year the course differs very little from the Latin-Scientific except in substituting for the study of Latin, shop-work or drawing.

SOPHOMORE YEAR.

Soils.—The origin, properties, both physical and chemical, relation to temperature, air and moisture, the effects of drainage, the purpose, effects and methods of tillage, causes of waste and methods of renovation.

Farm Crops.—Methods of culture, harvesting, preservation and use, and botanical relations. Their improvement by breeding and

selection, the choice of varieties and relative places in the farm rotation and economy.

Animal Husbandry.—Study of the various types and breeds of live stock, including their characters, development, and adaptability to local conditions.

JUNIOR YEAR.

Fertilizers.—Classification, methods and effects of action, sources, preparation, care, handling, application and uses. This includes both commercial fertilizers and farm manures, and is intended to give such knowledge of the principles underlying the use of fertilizers as would enable one to decide upon the economy of their use.

Dairying.—Lectures on the composition and treatment of milk, instruction in the use, and practice with the Babcock "Test;" determination of solids in milk; significance of various legal and commercial standards; the creaming of milk; description of creamery operations, such as separation, storage and treatment of cream; churning; necessity and method of herd testing.

Horticulture.—Lectures on the general theory and practice of orchard tillage, pruning and spraying; on the origination and improvement of varieties; on the principles underlying variety selection; on the fruits adapted to the Peninsula; on orchard machinery; on the propagation of fruits. Laboratory practice will supplement some of the lectures.

Entomology.—Lectures on the injurious insects of orchard, garden and field crops. The student will be given an account of the external and internal anatomy of insects; of their life histories; of their injury to the various crops; and of the means of holding them in control. Specimens of the insects under consideration will be placed before the class for examination.

SENIOR YEAR.

Stock Feeding.—The functions, nature, constituents, composition, digestibility and effects of the various foods used on the farm, including the food requirements of different animals; feeding standards, methods of compounding and using rations, and the various questions in the economy of food, its effect on product, etc.

Stock Breeding.—Study of the principles governing the choice and breeding of animals, including such topics as the heredity of normal and acquired characters, and of diseases; the causes

and laws of variation, methods of selection, influence of ancestors, fecundity, sex and relation of form to purpose.

Veterinary Science.—Lectures on the anatomy and hygiene of domestic animals, methods of keeping them in health, and the detection and treatment of some of the common and more important diseases which are found among them. Whenever possible, the students are shown cases of disease and the lecture given with the animal in view.

Plant Diseases.—The relation of fungi to diseases; their suppression, by hygienic measures; legislation against plant diseases; fungicides, their preparation and application; special consideration of the diseases affecting large and small fruits, vegetables, cereals and forage crops, ornamental plants and shade trees.

WINTER COURSE IN AGRICULTURE.

For the benefit of those young men who desire to become better farmers, and who feel that they cannot take our full four years course in agriculture, a short course has been arranged, coincident with the winter term of the College, beginning the first Tuesday in January and closing on the last Friday in March.

The work in this course is arranged as follows: instruction being given by such methods as seem best adapted to the subject taught, including lectures, laboratory work and study of text books or other literature.

Agricultural Chemistry—18 Lectures; A study of the substances entering into the composition of plants, including descriptions of the elements and their compounds, the general laws of chemical combinations and the uses of these substances in plants.

Fertilizers and their Uses—16 Lectures; Consideration of the ingredients used in the manufacture of fertilizers, their sources and composition, adaptability to different plants and soils. Methods and economy of their use, including home mixing and use of special fertilizers.

Soils and Manures—24 Exercises; The origin and composition of soils; their relations to heat, air and water; their chemical and physical properties. The effect of drainage, cultivation and tillage; the relation of crops and manures to the soil; benefits of rotation of crops. The preservation, composition and utilization of the various manurial substances found on the farm.

Breeds and Breeding of Live Stock—24 Exercises; Study of the various *breeds* of horses, cattle, sheep and swine, their history, characteristics and adaptability to different kinds of farming.

The *principles of breeding*, as applied to pure-bloods and to grades.

The Feeding of Farm Animals—16 Lectures; Study of the composition and digestibility of the various grains and fodders, their adaptability to different uses and the economy of their use.

Practice in the construction of rations for farm animals.

Dairying and Creamery Work—12 Lectures; The Chemistry of milk, the treatment of milk for sale or for butter making; creamery machinery and methods; testing for solids and fat; the commercial side of dairying.

Veterinary Science and Practice—24 Lectures; A study of the anatomy, physiology and pathology of the domestic animals, with the actions and uses of medicines; careful study of the preventive treatment of diseases.

Instruction in the methods of determining the age of animals.

Veterinary surgery, dealing especially with emergency cases.

Hygiene of domestic animals.

Plant Diseases—24 Lectures; How to preserve the plant in health and thus render it resistant to disease; relation of fungi to plant diseases; legislation against diseases; preparation and application of fungicides; consideration of diseases of special crops as cereals, small fruits, orchard fruits, vegetables.

Entomology—24 Lectures; This course will consist of lectures in economic entomology, the character of the work given having special reference to the needs of agriculture and horticulture. The student will be given an account of the life history of insects; their relationships; their internal and external structure; mode of living; and the application of these points to the destruction of insect pests. Specimens of insects under consideration will be studied.

Horticulture—36 Lectures; General course, including the theory and practice of orchard management; pruning, propagating, and spraying; fruit packing and marketing; cold storage; orchard machinery; the origination, improvement, and selection of varieties. Practical training will be given when convenient.

Agricultural Engineering—6 Lectures; *Principles* and *methods* of locating and constructing *under-drains*.

Construction and repair of *roads*, and their relation to the economy of the farm.

Study of practical methods of measuring land.

Shop Work—2 Exercises per week; Practical instruction in the handling and care of tools for working wood, and work at forge in blacksmithing.

Agricultural Physics and Mechanics—6 Lectures; Lectures and laboratory demonstration upon the elementary principles of physics in their relation to farm operations.

Admission and Expenses.—For admission to this course no examination is required, but to get the most benefit from it one should at least have completed the work in the common district schools.

There is no charge for tuition.

Further information concerning the course may be had by application to the President of the College.

CIVIL ENGINEERING.

The objects of the course of instruction in civil engineering are first, to fit those pursuing it previous to professional life to be, at graduation, immediately useful as assistants to engineers in charge of structures and works; second, to meet the needs of those who having been engaged, without a course of instruction, in professional work, desire to equip themselves for more successful competition with those who have had such instruction. As these objects can be most satisfactorily accomplished by such instruction as will impart accurate knowledge of natural laws and of the properties of materials, and such training as will develop power to apply that knowledge intelligently, the technical studies are preceded by liberal and thorough instruction in language and in the mathematical and physical sciences.

ENTRANCE REQUIREMENTS are fully stated on pages 14-18. In addition, knowledge of language and natural science as taught in our high schools will contribute much to the satisfactory progress of the student. That students may be able to take advantage of the opportunities offered in the way of training for professional life, they should enter College well prepared, *particularly in mathematics*.

DEGREES.—Each student who complies with all the rules of

the College and satisfactorily completes this course is eligible to the degree, Bachelor of Civil Engineering, (B. C. E.) As a portion of his work in course he must prepare as a thesis a written description, also such drawings as are necessary for its proper elucidation, of some structure, machine or process which he may have examined or designed. The description must be written upon thesis paper. Both description and drawings will be retained by the College as its property. They must be presented to the Professor in charge of the Department on or before the first day of May next preceding the time for the student's graduation. While throughout the preparation of this description students have the advice and aid of the Professor, in the first and second terms of the Senior year time is allowed in the course of instruction for working upon it under his immediate direction.

Each graduate who has been engaged for three years subsequent to his graduation in practical and successful work as an engineer, and who has prepared and presented to the Faculty a satisfactory thesis upon a topic related to his profession, is eligible to the professional degree, Civil Engineer, (C. E.) The thesis and drawings are retained by the College as its property.

Description of Course.—The College, by offering different courses of study, allows opportunity for the satisfaction of individual choice; but, believing it for the best interests of the student, prescribes, particularly in the technical courses, most of the work. The prescribed subjects are taken by all students who pursue the course. In each term of the Senior year each student elects one technical subject, by pursuing which he may make special preparation for a particular line of work.

On pages 32 and 33 is an outline of the course in civil engineering, naming the studies prescribed and stating the amount of time allotted to each. Following is a full description of the course.

Elsewhere in the catalogue, under their respective titles, is given additional information relating to the general studies and to the electives on Pumps and Hydraulic Motors, Applied Electricity and Theory of Electricity.

FRESHMAN YEAR.

English Composition.—Entire year, three periods per week. Lectures on theory of composition; writing of themes both in and outside of class hours.

Elocution.—Entire year, one period per week. Voice development, pronunciation, modulation. *Text, Hafford's Drill-Book of Elocution.*

History of American Politics.—Entire year, one period per week. Lectures covering period between 1789 and present time; collateral reading.

German or French.—Entire year, two periods per week. Reading, writing and oral translating. *Texts: in German, Joynes-Meissner's German Grammar* and *Hewett's German Reader; in French, Whitney's French Grammar* and *Kuhn's French Reader.*

Plane Trigonometry.—First term, five periods per week. Principles, solution of triangles, applications. *Text, Crockett's Elements of Plane and Spherical Trigonometry.* Followed by

Geometry.—First term, five periods per week. Solid geometry, problems in both plane and solid geometry. *Text, Gore's Plane and Solid Geometry.*

Analytic Geometry.—Second term, five periods per week. Elements; point, right line, circle, ellipse, parabola, hyperbola, problems. *Text, Young and Linebarger's Elements of Calculus.*

Calculus.—Second and third terms, five periods per week. Elements; derivatives of the simpler functions; simpler methods of integration; applications to mechanics and analytic geometry. *Text, Young and Linebarger's Elements of Calculus.*

Surveying.—Entire year, two periods per week. Principles; problems; use of chain, compass and level; theory and practice. *Text, VanAmringe's Davies' Elements of Surveying and Leveling.*

Steam Engines and Steam Boilers.—First and second terms, two periods per week. Description of details and of different types of engines and boilers. Instruction from text-book and trade catalogues and by the actual running of engines and management of boilers. *Text, Holmes' Steam Engine.* Followed by

Descriptive Geometry.—Remainder of year, two periods per week. Point, line and plane; applications. *Manual, Ames' Notes on Descriptive Geometry.*

Drawing.—Entire year, six periods per week. Lettering for working drawings; care and use of instruments; constructions in one plane including conic sections. *Manual, Anthony's Elements of Mechanical Drawing.*

Shop-work.—Entire year, six periods per week.

(a) Bench-work in wood.—Includes description of tools;

work with saw, plane, auger, bit, chisel and kindred tools in making joints, light cabinet work and models of roof and bridge trusses.

(b) Wood-turning.—Includes use of lathe tools in straight and compound turning in soft and hard woods; caliper work, hollow turning, turning to template, screw-plate and chuck work.

(c) Bench-work in metal.—Includes work on cast and wrought iron and brass,—chipping, use of file and scraper in producing flat and curved surfaces, fitting, slotting, dovetail work, screw-cutting with taps and dies, pipe-fitting.

Students who, previous to entrance, have satisfactorily completed such a course as that described, have more advanced courses of shop-work assigned them.

Military Science and Tactics.—Entire year, three hours per week. School of the soldier and of the squad, school of the cannoneer; squad, company and battalion drill; elements of first aid. Recitations and lectures. *Manual, U. S. Infantry Drill Regulations.*

SOPHOMORE YEAR.

English Composition.—Three periods per week as in Freshman year.

Elocution.—Entire year, one period per week. Voice development, gesture, position, delivery of selected declamations, and criticisms thereof. *Manual, King's Practice of Speech.*

German or French.—Entire year, two periods per week. Instruction as in Freshman year but with more attention to reading than grammar. *Texts: in German, Schiller's William Tell, Lessing's Minna von Barnhelm; in French, Whitney's French Grammar, Hugo's Hernani, Rostand's Cyrano de Bergerac.*

Spherical Trigonometry.—First term, four periods per week. Solution of triangles, applications. *Text, Crockett's Elements of Plane and Spherical Trigonometry.* Followed by

Algebra.—Theory of equations; special attention to numerical cubics. *Text, Taylor's College Algebra.*

Analytic Geometry.—Second term, four periods per week. General equation of conics; higher plane curves; solid analytic geometry; problems. *Text, Tanner and Allen's Analytic Geometry.*

Calculus.—Third term, four periods per week. Higher derivatives, general integration, problems. *Text, Young and Linebarger's Elements of Calculus.*

Physics.—Entire year, three periods per week. Laws and properties of matter; sound, heat, magnetism, electricity and light. Recitations, demonstrations, lectures and laboratory practice. *Text, Gage's Principles of Physics.*

Chemistry.—Entire year, three periods per week. Study of the chemical and physical properties and industrial uses of the metalloids, the metals and their more important compounds; lectures on the leading chemical industries, also full treatment of the metallurgy of iron and steel and the production of their commercial and structural forms. Instruction by recitations, lectures and visits of inspection to steel plants and chemical works. *Text, Wurtz's Elements of Modern Chemistry.*

Surveying.—First and third terms, one period, and second term, two periods per week. Theory of the construction and use of instruments; of land surveying with transit; of survey of Public Lands of United States, topographical surveying, city, hydrographic and mine surveying. Recitations and lectures. *Text, Merriman and Brook's Handbook for Surveyors.*

Physical Laboratory.—Entire year, three periods per week. Description, adjustment and use of instruments; measurements involving mass, length and time; determination of physical constants; repetition of certain classical experiments; discussion of results, deductions, reports. *Manual, Stewart and Gee's Lessons in Elementary Practical Physics, Vol. I.*

Field-Work.—First and third terms, three periods per week. Land surveying with transit; topography with transit, level, stadia and plane table.

Plotting.—Second term, two periods per week. Plotting and computations from students' own field-notes, involving use of scales, protractors and other office instruments.

Drawing.—Entire year, three periods per week. Orthographic projections in third angle; development and intersection of surfaces; screw threads, bolts and nuts; isometric drawing; working drawings. *Manual, Anthony's Elements of Mechanical Drawing.*

Military Science and Tactics.—Entire year, three hours per week. School of the company and of the cannoneer; squad, company and battalion drill; litter drill and first aid. Recitations and lectures. *Manual, U. S. Infantry Drill Regulations.*

JUNIOR YEAR.

Elocution.—Entire year, one period per week. Public speaking; original orations.

German or French.—Entire year, two periods per week. Writing of connected narration; oral rendering of same. Reading in German from Lessing's Nathan the Wise and Goethe's Faust; in French from Molière, Corneille and Racine. Lectures on works read and their authors.

Calculus.—Entire year, three periods per week. Applications to mechanics and analytic geometry; differential equations. *Texts, McMahon and Snyder's Differential Calculus, Murray's Integral Calculus.*

Mechanics.—Entire year, five periods per week. An elementary course in mechanics of both solids and fluids. *Text, Taylor's Theoretical Mechanics.* This is followed by a course in Mechanics of Solids in which are discussed, and illustrated by numerous problems, the geometric science of motion; the measurement of force and the effects of its action on the particle and the rigid body, including friction and work and energy; and the theory of center of gravity, moment of inertia and the radius of gyration. Recitations and lectures. *Text, Wright's Elements of Mechanics.*

Graphic Statics.—Entire year, two periods per week. Co-planar forces, concurrent and non-concurrent; friction, centre of gravity; numerous illustrative exercises. *Manual, Dobb's Elementary Geometrical Statics.*

Mineralogy.—Entire year, two periods per week. Occurrence and distribution of minerals; their morphological, physical and chemical characteristics; blow-pipe analysis; practice in determinative mineralogy; study of building stones. Recitations, lectures and laboratory practice. *Text, Dana's Minerals and How to Study Them.*

Surveying.—Entire year, two periods per week. Functions of the surveyor; principles for guidance in original surveys and resurveys; adjustment of observations by method of least squares; theory of construction and use of barometer; mathematical astronomy for field use. Recitations and lectures. *Reference book, Merriman's Elements of Precise Surveying and Geodesy.*

Chemical Laboratory.—Entire year, two and one-half periods per week. Qualitative analysis, including the preparation of the more important non-metallic elements and their compounds; a

study of the bases and acids, their detection and separation. *Manual, Thorp and Muir's Qualitative Chemical Analysis and Laboratory Practice.*

Field-Work.—First and third terms, three periods per week. Triangulation; precise measurement of base line and angles; precise leveling; use of aneroid barometer; determination of azimuth, latitude, time and longitude; use of sextant; comparison and adjustment of field instruments.

Drawing.—Entire year, three periods per week. Free-hand sketching of structural details and of machine parts; working drawings from the sketches; tracings and blue-prints; tinting and shading.

For second term, during an additional three periods per week, plotting and topographical drawing based on students' own field-notes; use of computing instruments.

Military Science and Tactics.—Entire year, three hours per week. School of the battalion, ceremonies; squad, company and battalion drill; artillery and litter drill; signaling. Recitations and lectures. *Manual, U. S. Infantry Drill Regulations.*

SENIOR YEAR.

Elocution.—Entire year, one period per week. Continuation of work commenced in Junior year; debates; parliamentary practice.

Hydromechanics.—First term, two periods, second and third terms, three periods per week. Hydrostatics; flow of water through orifices and tubes; flow in pipes and in conduits. *Text, Merriman's Treatise on Hydraulics.*

In this subject there is an elective course in theoretical and practical Hydraulics, including flow over weirs, flow in rivers, and determination and measurement of water power; also an elective course in Pumps and Hydraulic Motors. *Text in the latter, Björling's Water or Hydraulic Motors.*

Geology.—First and second terms, two periods, third term, one period per week. Principles of lithology and microscopic petrography; dynamic, structural, physiographic and historic geology. Recitations, lectures and field-work. *Text, Scott's Introduction to Geology.*

Sanitary Science.—Entire year, one period per week. Water, air, food, disposal and utilization of sewerage, ventilation, heating,

epidemics, disinfectants. Recitations and lectures. *Text, Wilson's Hand-book of Hygiene and Sanitary Science.*

Strength of Materials.—First term, three periods, second term, four periods per week. Theory of elasticity; simple stresses; strength of pipes and riveted joints; strength and stiffness of beams, columns and shafts. Investigation and design. Properties and structural forms of iron and steel. Recitations, lectures and laboratory. *Text, Merriman's Text-Book on the Mechanics of Materials.*

Highway Engineering.—Third term, two periods per week. Location, construction and maintenance of roads, streets and pavements, including study of tractive forces and of the properties of good road materials. Recitations and lectures. *Text, Spalding's Text-book on Roads and Pavements.*

Roofs and Bridges.—First and second terms, five periods per week. Lectures on the construction of the common types of truss; stresses in the common forms of roof and bridge trusses by the algebraic method; center of gravity, moment of inertia, and stresses in framed structures by graphic method; elementary problems in investigation and design. Recitations and lectures. *Texts, Merriman and Jaeoby's Text-Book on Roofs and Bridges, Parts I. and II.; Ricker's Construction of Trussed Roofs.*

In Bridge Engineering there is an elective course in which are illustrated methods of calculation used in practice, and the principles involved and methods employed in designing, constructing and erecting framed structures. Lectures and reference books are supplemented by visits to bridge works and to structures in course of erection.

Building Construction.—First term, two periods per week. Wood and its use in construction; framing of floors, partitions and roof trusses; roofing; paints and varnishes. Recitations, lectures and visits to structures. *Text, Rivington's Notes on Building Construction, Part I.*

In the elective course are presented the subjects of fire-proofing, mill-work and tall building construction, including the engineering features of modern building construction.

Masonry Construction.—Second term, one period, third term, three periods per week. Properties of building stones; preparation of natural stone; manufacture of artificial stones; manufacture and use of limes, cements, mortars and concrete; foundations; superstructures according to prospective needs of

individual students. Recitations, lectures, laboratory and visits of inspection. *Text, Baker's Treatise on Masonry Construction.*

Contracts and Specifications.—Third term, three periods per week. Synopsis of law of contracts; general and special features of specifications; descriptions of related documents and of the common forms of business paper; study of actual contracts and specifications. Instruction by lectures. *Reference, Johnson's Engineering Contracts and Specifications.*

Thesis.—First and second terms, two periods per week. Preparation of text and drawings. See under Degrees, pages 55 and 56.

Drawing and Field-Work.—The former a required course; entire year, two periods per week; the latter (between which and Engineering Laboratory there is an option) first term, four, third term, three periods per week. Illustrating the elective work of the student, the field practice including setting out and measurement of work.

Engineering Laboratory.—A required course in second term, four periods per week. Study of construction and use of testing apparatus, including testing machines and attachments; examination of structural materials; tests of strength, principally of hydraulic cements and of mortars; discussion of results; preparation of reports. *Manuals, Spalding's Hydraulic Cement; Smart's Handbook of Engineering Laboratory Practice.*

Also a course (between which and Field-Work there is an option) first term, four, third term, three periods per week. Work especially arranged to supplement and illustrate the elective course in Materials of Construction. *Manual, Johnson's Materials of Construction.*

Railroad Engineering (Elective).—First term, three; second, two; third, four periods per week. Location and construction, including the theory of reconnoissance, preliminary and location surveys, curves, slope stakes, earthwork and structures. Recitations, lectures and field-work. *Manuals, Carhart's Field Book for Civil Engineers; Nagle's Field Manual for Railroad Engineers; Webb's Railroad Construction.*

Track work, operation and the economic theory of location. Lectures and reference works.

The elective course in Applied Electricity includes treatment of the equipment and operation of electric railways. In connec-

tion with this the course in Theory of Electricity may be elected.

Water Supply (Elective).—First term, three; second, two; third, four periods per week. Requisites of a supply; source; construction and maintenance of systems for collecting, storing, purifying and distributing water. Recitations, lectures, reference works, visits of inspection. *Text, Folwell's Water Supply Engineering.*

Sewerage (Elective).—First term, three; second, two; third, four periods per week. Different systems for removal of sewage; design, construction, maintenance; individual sewers, sewer appurtenances; disposal and utilization of sewage. Recitations, lectures, reference works, visits of inspection. *Text, Folwell's Sewerage.*

Methods of Instruction.—As indicated in the foregoing description instruction is by recitations, lectures, laboratory, drafting-room, field and shop-work; by the use of current professional journals; and by visits, followed by reports, to structures in process of erection, good types of finished structures, and industrial establishments.

The main objects in laboratory, field and shop-work are to secure mental discipline; and, by illustrating principles and impressing facts, to supplement the work of the lecture room. Without subordinating the true educational function of these methods, work is so carried on as to give the student an intelligent preparation for similar work after graduation.

The visits of inspection and reports thereon are considered very important in developing correct methods of observation and description and in forming acquaintance with engineering works and industrial processes.

Facilities for Instruction.—The Department is well supplied with the necessary instruments for laboratory and field-work. The shops are well equipped. All equipment is of the best quality and is being rapidly increased. The Department has a working library, kept up to date, containing standard works in all branches of civil engineering. It is supplied, also, with the leading professional and scientific periodicals, both American and foreign, named in the general list on another page. Students are encouraged and taught to avail themselves of current technical matter in foreign languages as well as in their own.

EMPLOYMENT.—The course is in complete and successful operation. The training is thorough and the instruction such as to meet the demands of actual life. About two-thirds of those who have finished the course engaged, upon graduation, in different branches of professional work in which they continue to hold positions of increasing responsibility. Those graduates who have not entered the engineering profession are pursuing, with success, teaching, law, and business careers.

In regard to obtaining situations it may be said that frequently students have been able to engage themselves, during their long vacations, in engineering work; and some have secured permanent positions to be occupied at the completion of the course. While these opportunities are largely determined by industrial conditions, our instructors and alumni are always alert in assisting graduates to obtain positions and to secure professional advancement.

DEPARTMENT OF MECHANICAL AND ELECTRICAL ENGINEERING.

DESCRIPTION OF STUDIES AND METHODS OF INSTRUCTION.

Two courses are offered in this Department.

MECHANICAL ENGINEERING, a four years course leading to the degree of Bachelor of Mechanical Engineering.

ELECTRICAL ENGINEERING, a four years course leading to the degree of Bachelor of Electrical Engineering.

Each Graduate of either of these courses will, after three years of practical and successful work in his calling, and having prepared and presented to the Faculty at least six weeks before the June meeting of the Board of Trustees a satisfactory Thesis on a topic relative to his profession be eligible to the professional degree of M. E. or E. E. according to the course he may have pursued.

Favorable opportunities for instruction are offered in these important departments of scientific and technical training. The rapid increase of our manufactures, requiring the economical utilization of all sources of power, and the design, and construction of much special machinery, open a broad field for the mechanical Engineer, while Electrical Engineering, with its growing importance, the constantly increasing number of its applications and many possibilities, is a very attractive profession.

The courses in this Department are designed to teach the principles underlying Mechanical and Electrical Engineering, and to prepare young men to design, construct and supervise machinery and electrical apparatus, and meet successfully the problems which may arise in the practice of their profession.

In addition to the strictly technical studies, students receive instruction in the English language, Chemistry (including laboratory course, and metallurgy of iron and steel), Mathematics, Physics, German or French, together with a thorough course in Mechanics, comprising Mechanics of Solids, Mechanics of Materials, Hydromechanics, and Roofs and Bridges.

The Courses in Mechanical and Electrical Engineering are very closely allied, electrical energy being now most economically developed by mechanical devices which require a motive power furnished by some prime mover, so that the installation of an electrical plant requires a large amount of mechanical knowledge.

The courses, therefore, are identical for the first three years. In the Senior year they differentiate, each class pursuing separately those subjects pertaining to its particular branch, while some studies remain common.

The aim is to train men to unite correct theory with practical requirements. To accomplish this fully, much stress is laid on proficiency in the actual management and care of apparatus, much time being devoted to practical work.

For this purpose the department is furnished with a well equipped wood-working, machine, and blacksmith shop, and electrical laboratory containing motors, dynamos, storage battery and various testing instruments sufficient for a full course, new apparatus being added as necessary.

On pages 34-36 will be found an outline of the course in this department, with the time allotted to each subject. Following is a full description of the subject:

FRESHMAN YEAR.

English Composition.—Entire year, three periods per week. Lectures on Theory of Composition twice a week, with themes written from time to time in class, and fortnightly outside of class.

Elocution.—Entire year, one period per week. Includes voice development, pronunciation, modulation. Manual, *Hafford's Drill-Book of Elocution.*

American Politics.—Entire year, one period per week. Lectures covering period from 1789 to the present time. Collateral reading.

German or French.—Entire year, two periods per week. Reading, writing and oral translating. Texts: in German, *Joynes-Meissner's German Grammar* and *Hewett's German Reader;* in French, *Whitney's French Grammar* and *Kuhn's French Reader.*

MATHEMATICS.—Entire year, five periods per week.

Plane Trigonometry.—First Term, five periods per week. General principles, Oblique Triangles, and Applications, completed early in the first term. Text, *Crockett's Elements of Plane and Spherical Trigonometry.*

Geometry.—Follows Plane Trigonometry in first term. Solid Geometry. Problems in Plane and Solid Geometry. Text, *Gore, Plane and Solid Geometry.*

Analytic Geometry.—Part of second term. Five periods per week. Point, right-line, circle, ellipse, parabola, and hyperbola with problems. Text, *Young & Linebarger.*

Calculus.—Second and third terms, five periods per week. Derivatives of the Simpler Functions, The Simpler Methods of Integration, Applications to Mechanics and Analytic Geometry. Text, *Young & Linebarger.*

Surveying.—Entire year, two periods per week. General principles and problems, use of Chain, Level, Compass, etc. Text, *Van Amringe's Davies' Surveying.*

Steam Engines and Steam Boilers.—First and second terms, two periods per week. Description of details and of different types of engines and boilers. Instruction by text-book, use of trade catalogues and actual running of engines and management of boilers. Text, *Holmes' The Steam Engine.*

Descriptive Geometry.—Third term, two periods per week. Representation, in projection, of geometric magnitudes and solution of problems relating thereto; shades and shadows. Lectures and manual.

Mechanical Drawing.—Entire year, six periods per week.

Includes the care and use of drawing instruments. Geometrical construction in one plane, including lines, circles, regular polygons, conic sections, etc. As it is of importance that a mechanical draughtsman should be able to letter drawings plainly, and easily, a part of the time is given to practice in plain script and ornamental lettering. Manual, *Anthony's Elements of Mechanical Drawing.*

Shop-Work.—Entire year, six periods per week. The work in the shops is designed to teach the construction and use of tools and machines employed in mechanical work and as a preparation for the study of machine design in the Senior year. The shops are managed as nearly as possible like those of an actual manufacturing plant. In arranging the work care is taken that the class-room and shops may be mutually helpful. Thus, in wood-working, the technical names and reasons for the different forms of joints, splices, frames, etc., constructed, are pointed out, and in the iron work the different fastenings, methods of locking nuts, etc., are constructed and explained. This method is followed throughout the course, while in the class-room reference is always made to the application in the shops of the principles discussed, drawings and descriptions being required if necessary.

The courses in detail are as follows:

(a) Bench Work in Wood.—This includes the nature and use of tools, work with saw, plane, auger, bit, chisel and kindred tools, in making different joints, such as timber splices, mortises, tenons, mitres, dovetails, etc., frames, light cabinet work and roof and bridge trusses.

(b) Wood-Turning.—Comprises use of lathe tools in straight and compound turning in soft and hard woods, involving caliper work, hollow turning, turning to template, screw-plate and chuck work.

(c) Bench Work in Metal.—This comprises work on cast iron, wrought iron and brass,—chipping, use of file and scraper in producing flat and curved surfaces, fitting, slotting, dovetail work, screw-cutting with taps and dies, pipe-fitting.

Military Science and Tactics.—Entire year, three periods per week. Recitations in United States Infantry Drill Regulations, one period per week in second term.

School of the Soldier, and of the Squad, Company and Battalion Drill, School of the Cannoneer. Elements of First Aid. General lectures.

SOPHOMORE YEAR.

English Composition.—Entire year, three periods per week. Lectures on Theory of Composition twice a week, with themes written from time to time in class and every two weeks outside of class.

Elocution.—Entire year, one period per week. Includes voice development, gesture, position, delivery of selected declamations, and criticisms thereof. Manual, *King's Practice of Speech.*

German or French.—Entire year, two periods per week. Instruction as in Freshman year but with more attention to reading than grammar. Texts, in German, *Schiller's William Tell*, *Lessing's Minna von Barnhelm;* in French, *Whitney's French Grammar*, *Hugo's Hernani*, *Rostand's Cyrano de Bergerac.*

MATHEMATICS.—Entire year, four periods per week.

Trigonometry.—Spherical triangles, and Applications. Text, *Crockett's Elements of Plane and Spherical Trigonometry.*

Algebra.—Theory of Equations, particular attention to Numerical Cubics. Text, *Taylor's College Algebra.*

Analytic Geometry.—General Equations of Conics, Higher Plane Curves, Solid Analytic Geometry. Text, *Tanner & Allen's Analytic Geometry.*

Calculus.—Higher Derivatives and General Integration. Occasional Problems. Text, *Young & Linebarger's Elements of Calculus.*

Physics.—Entire year, three periods per week. Instruction by text book and lectures on Laws and Properties of Matter, Mechanics, Heat, Sound, Light, Magnetism and Electric Currents.

Physical Laboratory.—Entire year, five periods per week. This work is given with three objects in view: First, to give the students facility in the use of instruments and knowledge of the theory of their construction and adjustment. Second, to give a clearer perception of the principles of physics than can be secured by any other method; and third, to give practice in those experimental lines that will be most helpful in later engineering work. These objects are secured by numerous laboratory experiments in the different branches of physics. A more detailed description of this course will be found in the Department of Physics.

Chemistry.—Entire year, three periods per week. Includes treatment of the metalloids and the metals, lectures on the leading chemical industries, also full treatment of the metallurgy of iron and steel and the production of their commercial and structural forms. Instruction by text-book, lectures and visits of inspection to steel plants and chemical works. Text, *Wurtz's Elements of Modern Chemistry.*

Mechanical Drawing.—Entire year, three periods per week. Includes orthographic projection of objects, the third angle of projection being used. The projection of objects, parallel and oblique, to the plane of projection. Intersections and developments of surfaces. Use of auxiliary planes. Projection of helix,

screw-thread and bolt-head. Isometric and oblique projection. Manual, Anthony's Mechanical Drawing.

SHOP-WORK.—Entire year, three periods per week.

Includes Iron and Steel Forging.—This includes exercises in heating, bending, upsetting, welding, the making and tempering of punches, chisels, machine-cutting tools. Brief instruction is given in soldering, brazing and riveting.

Machine Work in Iron.—This includes straight and taper turning, facing and screw cutting on lathe, drilling and boring on lathe and drill press, surfacing, straight, spiral, end, and gear cutting on milling machine, planing, reaming, tool grinding, polishing, etc.

Military Science and Tactics.—Entire year, three periods per week. Recitations in U. S. Infantry Drill Regulations, one period per week in second term. School of the Company, duties of Non-Commissioned Officers (corporals appointed from this class), Squad, Company and Battalion Drill, Litter Drill, and First Aid, School of the Cannoneer. General lectures.

JUNIOR YEAR.

Elocution.—Entire year, one period per week. Public speaking; original orations.

German or French.—Entire year, two periods per week. Writing of connected narration; oral rendering of same. Reading in German from *Lessing's Nathan the Wise* and *Goethe's Faust;* in French from *Molière, Corneille and Racine.* Lectures on works read and their authors.

Mathematics.—Entire year, three periods per week. Calculus, and its applications to Mechanics and Analytic Geometry; Differential Equations. Text, *Murray's Integral Calculus, MacMahon & Snyder's Differential Calculus.*

Mechanics.—Entire year, five periods per week. In the first term is given an Elementary Course in Mechanics of both solids and fluids. Followed in the second and third terms by a more advanced course in the Mechanics of solids, including Analytical Mechanics. Geometric science of motion; action of force on a particle; on a rigid body; centre of gravity, moment of inertia and radius of gyration. Instruction by text-book and lectures. Text, *Taylor's Theoretical Mechanics, Robinson's Elements of Dynamics.*

Chemical Laboratory.—Entire year, two periods per week. Course parallel with instruction of Sophomore year. Analysis

of simple and complex substances in the wet way; analysis by use of the blow-pipe and flame reactions. Manual, *Thorpe and Muir's Qualitative Chemical Analysis and Laboratory Practice.*

Kinematics.—First and second terms, three periods per week. This includes a study of the transmission of motion by machine parts, such as clutches, belts, cams, screws, gearwheels, links, etc. The teeth of wheels are constructed and velocity diagrams for the various motions are laid down, many problems being worked out on the drawing board.—Text, *Elementary Mechanism, Stahl & Wood.*

Graphical Statics of Mechanicism.—Third term, three periods per week. The graphic methods of obtaining the equilibrium and efficiency of mechanisms are taught. The harmful resistances caused by friction are considered and numerous problems are worked out on the drawing board.—Text, *Graphical Statics, Hermann-Smith.*

Valve Gears.—First and second terms, two periods per week. The action of valves is studied and the Zeuner diagram as applied to the Stephenson link, and to the radial and automatic cut-off gears. The ball governor is considered. Much of the work is done on the board.—Text, *Spangler's Valve Gears.*

Electricity.—Third term, three periods per week. This course is intended as a continuation of the subject of electricity and magnetism as begun in the course of physics, and is designed to give a clear and accurate knowledge of the experiments upon which the sciences of Electricity and Magnetism are based, and of the exact laws governing them, which have been discovered. Text, *Silvanus Thompson, Elementary Lessons in Electricity and Magnetism.*

Mechanical Drawing.—Entire year, three periods per week. Free hand sketching of structural details and machine parts, and making drawings from sketches. Making working and detail drawings, showing all necessary views and sections. Tracing and blue-printing drawings for shop use, tinting and shading; attention is paid to the conventional methods of representing different materials.

Shop-Work.—Entire year, three periods per week. After the regular series of exercises in iron work have been completed, so that students have acquired facility in handling the different machines, further practice is given in building apparatus and machines from designs made in the college.

Pattern Making and Mouldings.—A series of patterns including patterns for pipe joints, valves, couplings and pillow-blocks, etc., is first completed and by means of these the actual process of moulding is illustrated. More complex patterns and patterns for actual machines to be constructed in the shops are then made.

Military Science and Tactics.—Entire year, three periods per week. Recitations in U. S. Infantry Drill Regulations, one period per week in second term. School of the Battalion, ceremonies, etc. Sergeants appointed from this class. Squad, Companys and Battalion Drill. Elements of Signalling, Artillery and Litter Drill. General lectures.

SENIOR YEAR.

Elocution.—Entire year, one period per week. Continuation of work in Junior year, debates, parliamentary practice.

Hydromechanics.—First term, two periods per week. Hydrostatics; flow of water through orifices and tubes; flow in pipes and in conduits. Text, *Merriman's Treatise on Hydraulics.*

Mechanics of Materials.—First term, three periods per week; second term, four periods per week. Theory of elasticity; simple stresses; strength of pipes and riveted joints; strength and stiffness of beams, columns and shafts. Investigation and design. Properties and structural forms of iron and steel. Instruction by text-book, lectures and laboratory. Text, *Merriman's Text-Book on the Mechanics of Materials.*

Roofs and Bridges.—First term, five periods per week. Lectures on the construction of the ordinary types of truss; stresses in the common forms of roof and bridge trusses by the algebraic method; principles of graphic statics; center of gravity, moment of inertia, and stresses in framed structures by graphic method; elementary problems in investigation and design. Instruction by text-book and lectures. Text, *Merriman and Jacoby's Text-Book on Roofs and Bridges, Parts I. and II.*

Contracts and Specifications.—Third term, three periods per week. This course includes a presentation of the laws of contracts, a treatment of the general features of engineering specifications with descriptions of the related documents and their uses, and of the common forms of business paper. Text, *Johnson's Contracts and Specifications.*

Thermodynamics.—First term, five periods per week. This includes the thermodynamics of gases, of saturated and super-

heated steam, with application to steam and gas engines and injectors. Text, *Röntgen-DuBois.*

Steam Engine Design.—First and second terms, three periods per week. In this course is taken up the discussion of rules and formulas for the proper determination of the relative proportions of the different parts of the steam engine. Each student is required to design the principal parts of a steam engine, calculating for strength, appearance, and economy. Some details are fully worked out and working drawings made for them.—Text, *Steam Engine Design*, *Marks.*

Machine Design.—Entire year, three periods per week. In this course, some time is given at first to the materials used in machine construction, followed by a discussion of the rules and formulas for designing the details of machines, taking into consideration the strength required and the wear to which the parts may be subjected. This includes strength of screws, bolts, nuts, keys, cotters, and other fastenings, journals, shafts, couplings and gearing, and the pressure in bearings. As successful design requires a knowledge of the combinations and methods used in good practice, much time is devoted to making drawings of existing machines, and machine parts. Each class will, if possible, work out one or more designs, and furnish working drawings and sketches of details. Text, *Machine Design*, *Bemis & Low.*

Steam Boiler Design.—Second and third terms, three periods per week. This includes the value of fuels, efficiency of heating surfaces of types of boilers, size of parts, allowing for strength and corrosion, arrangement of flues and chimneys, of steam and feed pipes, and methods of setting. Students are required to calculate the parts of a steam boiler and to furnish drawings for a boiler and setting, from their own designs. Text, *Steam Boilers*, *Peabody & Miller.*

Pumps and Hydraulic Motors.—Third term, three periods per week. Pumps, both rotary and reciprocating, are studied with the different classes of hydraulic motors. The great economy of water power, and the facility with which it can be converted into electrical energy, and conveyed to a distance, has given an impetus to the development of this source of power, therefore a large part of the course is devoted to water wheels, especially turbines. Text, *Water or Hydraulic Motors*, *Björling's.*

Transmission and Measurement of Power.—Third term, three periods per week. This includes a study of the arrangement

of machinery and methods of transmitting power, both mechanical and electrical. The measurement of power developed by motor, or absorbed by machines, by means of absorption and transmission dynamometers.

Visits are made to the engineering plants in neighboring cities, and descriptions required of the arrangement of machinery, belting, shafting, etc.

THESIS.—As a portion of the work in this course the student is required to prepare and present to the Professor in charge of the department, on or before the first day of May in his Senior year, a thesis, which shall include a written description of some power plant, machine or process which the student shall have either personally examined or designed, with all the drawings necessary to fully illustrate the subject. The student is expected to select his subject and begin work upon it early in his Senior year, and to aid in the work, during the second term, three periods a week are set apart. The student is encouraged to make his thesis the subject of an original design or investigation, and the instructors in the department are at all times ready to give advice or assistance.

SHOP-WORK AND MECHANICAL LABORATORY.—Entire year, six periods per week. Work is done on special machines building in the shop; fitting, erecting and aligning machinery and shafting. The Laboratory course includes management of engines and boilers. Next follows measurement of weights, volume, area, temperature, etc., use of indicator, tests of pressure gauges, of quality of steam, power and efficiency tests of steam and gas engines, boilers, injectors, etc. The quality of lubricating oils, amount of friction, etc., is experimentally determined and the power used by machines is measured.

ELECTRICAL ENGINEERING.

The subjects in the Freshman, Sophomore and Junior years are common to both branches of Engineering and full descriptions will be found beginning on page 34

SENIOR YEAR.

Elocution.—Entire year, one period per week. Continuation of work in Junior year, debates, parliamentary practice.

Hydromechanics.—First term, two periods per week. Second and third terms, three periods per week. Hydrostatics; flow of water through orifices and tubes; flow in pipes and in conduits. Text, *Merriman's Treatise on Hydraulics.*

Contracts and Specifications.—Third term, three periods per week. This course includes a presentation of the law of contracts, a treatment of the general features of engineering specifications with descriptions of the related documents and their uses, and of the common forms of business paper. Text, *Johnson's Contracts and Specifications.*

Thermodynamics.—First term, four periods per week. This includes thermodynamics of gases, of saturated and superheated steam, with application to steam and gas engines and injectors. Text, *Röntgen-DuBois.*

Steam Engine Design.—First term, three periods per week. In this course is taken up the discussion of rules and formulas for the proper determination of the relative proportions of the different parts of the steam engine. Text, *Steam Engine Design, Marks.*

Machine Design.—Entire year, three periods per week. In this course, some time is given at first to the materials used in machine construction, followed by a discussion of the rules and formulas for designing the details of machines, taking into consideration the strength required and the wear to which the parts may be subjected. This includes strength of screws, bolts, nuts, keys, cotters and other fastenings, journals, shafts, couplings and gearing, and the pressure on bearings. As successful designing requires a knowledge of the combinations and methods used in good practice, much time is devoted to making drawings of existing machines, and machine parts. Each class will, if possible, work out one or more designs, and furnish working drawings and sketches of details. Text, *Machine Design, Bemis & Low.*

Steam Boiler Design.—Second term, three periods per week. This includes value of fuels, heating surfaces of types of boilers, size of parts, allowing for strength and corrosion, arrangement of flues and chimneys, of steam and feed pipes, and methods of setting.

Pumps and Hydraulic Motors.—Third term, three periods per week. Pumps, both rotary and reciprocating, are studied, with the different classes of hydraulic motors. The great economy of water power, and the facility with which it can be converted

into electrical energy, and conveyed to a distance, has given an impetus to the development of this source of power, therefore a large part of the course is devoted to water wheels, especially turbines. Text, *Wate or Hydraulic Motors*, *Björlig*.

Electrical Measurements.—First term, one period per week; second term, two periods per week. Class-room instruction includes construction and calibration of testing instruments, the measurement of currents, potential, resistance, capacity, insulation, etc. Some time is given to photometry.

Laboratory work closely follows the class-room instruction. At first very close supervision is given to the work, that correct methods of using the apparatus may be acquired, after which the student is left more and more to his own resources in order that he may gain confidence in himself. Text, *Electrical Measure ments*, *Carhart & Patterson*.

Dynamo-Electric Machinery.—The laws of electro-magnets and of magnetic circuits are first studied and the principles are applied to dynamos and motors, the design and construction of the parts being taken up in detail. Attention is given to the characteristic curves and efficiencies of the different types.

Alternating Current Machinery is next taken up, the design and construction of dynamos, motors and transformers being treated as in direct current work. Text, *Dynamo Electrical Machinery*, *Thompson*.

Applied Electricity.—Third term, five periods per week. A study is made of electricity as applied to domestic purposes, including electric bells, annunciator work, gas-lighting, fire and burglar alarms, etc., electric telegraph and telephones. Attention is given to electro-deposition of metals, including electro-plating, electro-typing and smelting and refining metal.

A study is made of the arrangement of generating plants, erection of distributing lines and interior wiring on the different systems, arc and incandescent lamps, distribution of power to mills, etc., from central plants, electric railways, including lines, circuits, and motors with methods of control. This work is supplemented by visits of inspection to lighting and power plants and by constant reference to the current electric journals.

THESIS.—As a portion of the work in this course the student is required to prepare and present to the Professor in charge of the department, on or before the first day of May in his Senior year, a thesis which shall include a written description of some

power plant, machine, or process which he has either personally examined or designed, with all the drawings necessary to fully illustrate the subject. The student is expected to select his subject and begin work upon it early in his Senior year, and to aid him in the work, during the second term, three periods per week are set apart. The student is encouraged to make his thesis the subject of an original design or investigation, and the instructors in the department are at all times ready to give advice or assistance.

Laboratory Work.—After some skill in the management of dynamos has been acquired, time is given to the electromagnet and tests of reluctance, inductance, hysteresis and leakage are made. Characteristic curves and efficiencies are found for different types of machines. On account of the growing importance of storage batteries considerable time is given to their construction and management.

Laboratory work includes wiring, testing of lines, lamps, etc., and general management of electrical apparatus.

In addition there is given a laboratory course in Mechanical Engineering, including use of the indicator, tests of pressure gauges, quality of steam, efficiency of engines and boilers and measurements of power.

MILITARY SCIENCE AND TACTICS.

All students, not in the Senior class, are required to take military instruction. Excuses are granted by the Faculty, only for physical disability or conscientious scruples. The great benefit of the exercise thus taken, together with habits of promptness, etc., aside from better fitting young men for patriotic duty in time of need, is universally recommended.

Members of the Senior class may, at their option, take the Military Course, but they must signify their intention to do so at the beginning of the collegiate year, and, must for that year, unless excused by the Faculty, remain in the Military Department, subject to its rules and regulations.

Three hours per week, throughout the year, are given to this course. Of this time, one hour per week, during the second term, is devoted to theoretical instruction. Part of this time is given to a series of general lectures on military subjects and on the elements of First Aid to the Injured.

FRESHMAN YEAR.—School of the Soldier and of the Squad, Close and Open Order; followed by examination. U. S. Infantry Drill Regulations. Practical Instruction in the School of the Soldier, Squad, Company and Battalion. Bayonet Exercise, Aiming Drill, School of the Cannoneer. Elements of First Aid. Upon the conduct and proficiency of this year depends the appointment of corporals for the next year.

SOPHOMORE YEAR.—School of the Company, Open and Close Order; Duties of Guides in Battalion Drill; followed by an examination. U. S. Infantry Drill Regulations.

Practical instruction as before. Company papers. School of the Cannoneer. Litter Drill and First Aid.

Corporals are appointed from this class; on their conduct and proficiency depends the appointment of sergeants in the next class.

JUNIOR YEAR.—School of the Battalion, Open and Close Order; Ceremonies; followed by an examination. U. S. Infantry Drill Regulations.

Practical instruction as before. Elements of Signaling. Assist at Artillery and Litter Drill. Official papers and books.

Sergeants are appointed from this class; on their conduct and proficiency depends their selection as officers in the next year.

SENIOR YEAR.—An essay upon some military subject. Conduct recitations and drills of the lower classes. Perform the duties of their office and practice those of the higher rank. Have charge of official papers and books.

Officers are appointed from this class; the three standing highest in conduct and proficiency will be recommended to the Adjutant General, U. S. Army, for mention in the Army Register.

The National Government supplies arms, ammunition and equipments, and details an officer; the College furnishes the necessary books.

The uniform consists of cadet gray trousers and blouse, blue cap, white gloves, white standing collar and black shoes. The trousers, blouse and cap cost about $16.50, are durable, well and neatly made.

The Delaware Daughters of the American Revolution and the friends of the late Lieutenant Churchman have, through the Board of Trustees, established a "Lieutenant Clarke Churchman Memorial Fund," the income from which is to be used for the encouragement of military virtues and instruction by the annual

presentation of a premium to the student who shall attain the highest proficiency in that department.

LIBRARIES.

The combined libraries of the College contain about 11,200 volumes, about 600 bound volumes having been added during the past year.

Each department of instruction has its own library of reference works in its class room or laboratory, under the immediate supervision of the professor in charge, from which students may draw books for use in connection with their work.

The general library in which are most of the books on literature, history, economics, philosophy, etc., is, together with the reading-room, open to students at all times of the day and evening.

This library is classified on the Dewey system and a shelf-list intended to serve also as a catalogue is kept complete.

New books are continually being added, so that the libraries may fairly represent current thought on all subjects connected with the college work.

The library has been designated as one of the depositories for the public documents of the United States government and from this source receives many valuable publications.

Several friends of the college have made valuable additions to the library by the presentation of books, magazines and pictures.

The librarian is especially desirous of obtaining publications relating to the history of Delaware and would be glad to correspond with any one having such documents.

READING ROOM.

On the second floor of the Recitation Hall a large well-lighted room is given up for a reading-room and general library. Ample seating capacity is provided for as many students as may wish to use the room at any time. The following list of periodicals will show the character and scope of the literature provided.

The most useful of these periodicals are bound and placed on the library shelves thus becoming a valuable part of our book collection.

Educational Review, School Review, Education, Journal of Education, Forum, North American Review, Review of Reviews, Critic, American, Outlook, Nation, Fortnightly Review, Contemporary Review, Nineteenth Century, Athenaeum, Quarterly Review, Weekly Times (London), Punch, Revue des Deux Mondes. Journal des Debats, L'Illustration, Le Monde Illustré, Illustrirte Zeitung, Book Reviews, Scientific American Supplement, Popular Science Monthly, Sanitarian, International Monthly, Nature, Science, American Naturalist, Popular Astronomy, Journal of the Society of Arts (London), Army and Navy Register, Farmer's Voice, Breeder's Gazette, American Grange Bulletin, National Stock Grower and Farmer, Farming, Farm Home, Practical Farmer, Delaware Farm and Home, Advocate of Peace, Presbyterian, Peninsula Methodist, Delaware Churchman, Harper's Weekly, Harper's Monthly, Scribner's, Century, Atlantic, McClure's, Outing.

Besides these publications, which are open to students at all times, each department has several technical journals available to those interested. The list of these journals follows:

Journal D'Agriculture Pratique, Annales Agronomiques, Physical Review, Astro-Physical Journal, Zeitschrift für Physikalischen and Chemischen Unterricht, Zeitschrift für Instrumenten-kunde, Annalen der Physik und Chemie, Philosophical Magazine, American Mathematical Journal, Annals of Mathematics, Mathematical Gazette, American Mathematical Monthly, Bulletin of the American Mathematical Society, Railroad Gazette, Engineering Record, Engineering News, Engineering Magazine, Science and Industry, Municipal Engineering, Proceedings of American Society of Civil Engineers, Journal of the Association of Engineering Societies, London Electrician, L'Electricien, Electrical Engineer, Western Electrician, Electrical World, Engineering, Power, American Machinist, Scientific American, American Journal of Science, Proceedings of the Royal Society, Proceedings of the Royal Institution, Engineering and Mining Journal, Zeitschrift für Krystallographie und Mineralogie, Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege, Neues Jahrbuch für Mineralogie, Geologie and Paleontologie, Tschermak's Mineralogische und Petrographische Mittheilungen, Meyer's Jahrbuch der Chemie, Jahres-bericht für Hygiene, Modern Language Notes, American Journal of Philology, American Chemical Journal, Journal of the American Chemical Society.

Through the courtesy of the publishers, many of our State papers are regularly found on the tables of the Reading Room.

GENERAL REMARKS.

Apparatus.—The various scientific departments of the College are well equipped with modern apparatus of the most approved form, and additions are made as the needs of instruction and advances of science demand.

Laboratories.—The several scientific departments have large well lighted laboratories supplied with water and gas, and furnished with ample equipment of apparatus and appliances.

THE WORK-SHOPS.—The work-shops contain iron and wood-working tools sufficient for a thorough course in the best modern shop practice. There are also housed in the shops, engines, dynamos, motors and other necessary appliances for mechanical and electrical testing and measurement.

MINERALOGICAL CABINET.—The College possesses valuable geological and mineralogical collections systematically arranged and readily accessible for use.

NATURAL HISTORY COLLECTIONS.—The College already has the nucleus of a Museum of Natural History, in the shape of the collections of invertebrates and skeletons, mentioned under Zoölogy.

In addition to this material it has several Auzoux models illustrating different forms or parts of animals.

In order that these collections may be increased and thus become more valuable to all connected with the institution, we request the friends of the College who may come into possession of specimens suitable for a museum to correspond with us relative to their preservation. It is especially desirable for us to build up a museum which shall contain representatives of all animals and plants found wild in Delaware.

DEPARTMENT LIBRARIES.—Each department of the College possesses a special library of standard books and journals under the immediate care of the professor in charge. These libraries are open to the students at all times during College hours.

VISITS TO MANUFACTORIES.—Opportunities will be given each year for students to visit the excellent manufacturing establishments of Wilmington, Chester, Baltimore and Philadelphia, where they, in company with a professor, may witness and study the practical application of science, as illustrated in the most successful manufactories in the country.

STATE CHEMIST.—The professor of chemistry in the College is by legislative enactment ex-officio State Chemist for Delaware.

STATE BACTERIOLOGICAL AND PATHOLOGICAL LABORATORY. —By Act of the Delaware Legislature, a State Bacteriological and Pathological Laboratory has been established. The offer of the College to give room for the laboratory and to furnish the trained supervision of the Bacteriologist of the Experiment Station was accepted. The laboratory is under the management of the State Board of Health. Its location makes accessible the resources of the college in the way of libraries and apparatus. Under the pro-

visions of the Law, the general direction of the scientific work of the Laboratory is in the hands of Professor Frederick D. Chester, as Bacteriologist. A. Robin, M. D., was appointed by the State Board of Health as Pathologist of the Laboratory and assumed the duties of the position April 1, 1899.

EXAMINATIONS.—Examinations in all subjects are held at the close of each term and are conducted either in writing, or orally, as the nature of the subject may require or as the professor may prefer. Review examinations are also held at other times whenever, in the judgment of the professor, the objects of instruction may be promoted by such means. The examinations are designed not as mere tests of the student's knowledge, but as a valuable training in rapid, concise and accurate expression. They serve as a valuable means of giving the student a ready command of his mental powers and, by encouraging a review of a period of work, they give him a broader view and a firmer hold of the different subjects of study.

In determining a student's fitness to proceed to a higher class great weight is given to the character of his performance of recitation room duties. The results of the term examinations are combined with the recitation records, but in fixing the student's standing the quality of his recitation work is the weightier factor.

In the case of failure to pass in any study, the student must satisfy the professor in charge that he has made up his deficiency before the condition can be removed. Reasonable opportunities will be given him to show by examination that he has qualified himself to take good standing in the subject in which he was found deficient.

If at the beginning of any year a student's record of the preceding year shows that he is deficient in too many subjects to maintain his class standing he will not be advanced, but will be required to go over the work in which he has failed. If such condition is brought about by idleness and neglect, change of habit or withdrawal from the College will be required. Every encouragement will be given to the willing and earnest student, but his best interests demand that he shall not undertake what he is not prepared to perform.

REPORTS.—At the close of every term a report of each student's combined recitation and examination record will be sent to his parent or guardian. These reports show the course of study the student is pursuing and the class in which he is enrolled.

Parents are urged to give them close attention and to co-operate with the faculty in correcting habits of idleness and indifference when the reports indicate any lack of attention to duty.

ATTENDANCE.—Students are required to be regular in attendance upon College duties.

Any student who does not return punctually at the opening of a term must present a satisfactory excuse, in writing, from his parent or guardian, and sustain an examination in the studies pursued by his class during his absence. The same rule applies to such as lose a part of their course by absence during the term unless specially excused by the Faculty.

Students are required to occupy such rooms as may be assigned to them by the President, and are not allowed to remove without his permission.

RELIGIOUS INSTRUCTION.—The College is in no sense sectarian, but every student is expected to attend public worship at least once each Sunday at such place as the parent or guardian may select. All the students, except such as may be excused are required to be present at the daily morning prayers.

GOVERNMENT.—Discipline is administered by the Faculty. The government is mild but firm. Sound principles of morality are inculcated, and sentiments of manliness, honor, and self-respect are impressed upon the students. Misbehavior is reprimanded privately, and for gross disorder the parent or guardian is notified and requested to remove the offender. Suspension or expulsion is the last resort.

Students are not allowed to visit saloons or other places of resort that might injuriously affect their morals.

Under ordinary circumstances students will not be permitted to visit neighboring cities and towns without the permission of their parents or guardians, or of the President of the College. Permission granted by parents or guardians must be written and deposited with the President.

Every student, upon entering the College is furnished with a printed copy of the laws and regulations for the government of the institution.

FACULTY ADVISERS OF STUDENTS.

For the purpose of assisting the students in everything that concerns their best interests and of keeping up close advisory relations with them, each student, upon entering college, will be

assigned to some professor who will act as his class officer, and will counsel and guide him in all matters pertaining to his studies.

EXPENSES.

	1st Term.	2d Term.	3d Term.
Tuition	$24.00	$18.00	$18.00
Fuel for Oratory and Recitation Rooms	1.00	.75	.25
Janitor's fee for care of Recitation Rooms, etc.	1.50	1.25	1.25
Use of Library	1.00	.75	.75
Incidental Expenses	1.00	.75	.75
Total for Students not rooming in College	$28.50	$21.50	$21.00
" " those having Free Scholarships	4.50	3.50	3.00

EXTRA FOR STUDENTS ROOMING IN THE COLLEGE.

Room Rent	$ 4.00	$ 3.00	$ 3.00
Heat for Rooms	4.00	3.00	1.00
Janitor's Wages for care of Rooms	1.50	1.25	1.25
Total for Students rooming in the College	$38.00	$28.75	$26.25
" " those having Free Scholarships	14.00	10.75	8.25

Tuition is free for all students from Delaware.

In addition to the foregoing charges, each student, upon entering the College, will pay $5.00 as an entrance fee.

Students in Chemistry are charged a fee of $2.50 a term for such articles as are consumed in making experiments.

The students rooming in the College dormitory have formed an association, in which table board is served at less than $3.00 a week.

Students furnish their rooms and provide themselves lights, books, and stationery.

PAYMENT.—*College bills for each term are due and payable in advance.* In case of prolonged absence from sickness, casualty, or other sufficient cause, a proper amount of the term payment will be refunded to the student.

All arrearages must be paid or provided for before the candidate for graduation shall be entitled to receive a diploma.

PRIZES.

THE BISHOP COLEMAN PRIZE.

The Rt. Rev. Leighton Coleman, LL. D., S. T. D., Bishop of Delaware, offers an annual prize of twenty-five dollars to be awarded to the member of the graduating class having in all respects the best standing in the Senior year.

THE ALUMNI PRIZES.

The Alumni Association offers annually three prizes of twenty, fifteen, and ten dollars, respectively, for the three best declamations at the public contest, open to all students below the Senior class.

THE SOPHOMORE ENGLISH LITERATURE PRIZE.

John P. Cranford, Esq., of New York City, offers a prize of fifty dollars to the student of the best standing in English Literature in the Sophomore Class of the year 1900-01.

LIEUTENANT CLARKE CHURCHMAN MEMORIAL PRIZE.

The Delaware Daughters of the American Revolution and friends of Lieutenant Clarke Churchman have established a "Lieutenant Clarke Churchman Memorial Fund," the income from which is to be used for the encouragement of military virtues and instruction by the annual presentation of a premium to the student who shall attain the highest proficiency in that department.

Degrees Conferred at the Annual Commencement, June 21, 1899.

GRADUATE DEGREES.

MASTER OF ARTS.

Edward Lawrence Smith.

MASTER OF SCIENCE.

Ira Liston Pierce.

ELECTRICAL ENGINEER.

Carl Harrington.

BACHELOR OF ARTS (Classical Course).

Andrew Donnell Marshall.
Harrison Wilson Vickers, Jr.

BACHELOR OF ARTS (Latin Scientific Course).

Louis DuHadway,
Everett Clarence Johnson,
Frank Olin McSorley,
Edward Henry McCabe,
Harley King McCabe,
George Lodge Medill,
George Harlan Wells.

BACHELOR OF CIVIL ENGINEERING.

Richard Paul Reed.

BACHELOR OF MECHANICAL ENGINEERING.

Willard Franklin Wood,
Harold Green.

BACHELOR OF ELECTRICAL ENGINEERING.

Joseph West Brown.

Prizes Awarded at the Commencement of 1899.

The Bishop Coleman Prize,

TWENTY-FIVE DOLLARS,

George Harlan Wells.

The Cranford English Literature Prize,

FIFTY DOLLARS,

Henry Goodman McComb.

The Alumni Prize for Elocution,

First Prize, *Fifteen Dollars*—Roger Owen Mason.
Second Prize, *Ten Dollars*—Thomas George Baxter.
Third Prize, *Five Dollars*—Hugh Rodney Sharp.

The Roberts Medal for the Best Drilled Company,

Company A, Joseph West Brown, *Captain*.

STUDENTS IN ATTENDANCE DURING THE COLLEGIATE YEAR 1899–1900.

GRADUATE STUDENTS.

BREWSTER, JOSEPH FERGUS, B. A., 1898, Wilmington.
Chemistry.

CONNER, SAMUEL LUCAS, B. A., 1897, Wilmington.
Latin.

ELLIS, ALFRED LEE, B. C. E., 1893; B. A., 1896, Newark.
Biology.

MCINTIRE, GEORGE, B. A., 1896, Delaware City.
French, German, Anglo-Saxon and English Literature.

UNDERGRADUATE STUDENTS.

SENIOR CLASS.

Ayars, Edward James	Civil Eng.	Wilmington.
Baynard, Samuel Harrison, Jr.	Lat Sci.	Wilmington.
Baxter, Thomas George	Classical	Slaughter.
Conner, William Henry	Lat. Sci.	Wilmington.
Constable, Reginald	Classical	Elkton, Md.
Hartman, Afred Hanson	Civil Eng.	Wilmington.
Hirsh, William Louis	Elect. Eng.	Osceola Mills, Pa.
Hyland, Charles Scott	Civil Eng.	Wilmington.
Mason, Roger Owen	Lat. Sci.	Newark.
McKeon, Thomas Becker	Elect. Eng.	Newark.
Nivin, Thomas Rankin	Lat. Sci.	Strickersville, Pa.
Sentman, Jacob Elmer	Lat. Sci.	Newark.
Sharp, Hugh Rodney	Lat. Sci.	Lewes.
Trotter, West Alexander	Lat. Sci.	Wilmington.
Woodward, George Daniel	Elect. Eng.	Wilmington.

JUNIOR CLASS.

Cann, John Pearce	Classical	Kirkwood.
Cann, Richard Thompson, 3d	Lat. Sci.	Kirkwood.
Cheney, Lowther	Classical	Henry Clay.
Evans, Fred	Civil Eng.	Henry Clay.
Griffin, Edgar Byron	Lat. Sci.	Newark.
Maier, Harry Ludwig	Civil Eng.	Wilmington.
Marshall, William, Jr.	Classical	Milford.
McComb, Henry Goodman	Mech. Eng.	Wilmington.
McCoy, John Willard	Lat. Sci.	New Castle.
McDonald, Cecil Clark	Lat. Sci.	Newark.
McMullin, William Norman	Lat. Sci.	St. Georges.
Naudain, William Peoples	Agriculture	Marshallton.
Ott, Samuel J.	Mech. Eng.	Wilmington.
Stockly, Charles Daniel	Lat. Sci.	Smyrna.
Tunnell, Herbert Rodney	Mech. Eng.	Georgetown.
Wolf, Theodore Rudolph, Jr.	Mech. Eng.	Newark.

SOPHOMORE CLASS.

Avis, Edward Spaw, Jr.	Gen. Sci.	Newark.
Baker, Elisha Monroe	Irregular	Selbyville.
Clifton, Alfred Lee	Classical	Smyrna.
Cooper, Curtis Calvin	Lat. Sci.	Wilmington.
Evans, Harry Cleaver	Civil Eng.	Elkton, Md.
Evans, William Sterling	Irregular	Elkton, Md.
Fader, William Lewis	Elect. Eng.	Newark.
Green, Lucien	Agriculture	Middletown.
Harrington, Willis Fleming	Lat. Sci.	Farmington.
Huxley, John Wagstaff, Jr.	Lat. Sci.	Wilmington.
Jones, Pusey	Civil Eng.	Montchanin.
Kelley, George Dougles, Jr.	Civil Eng.	Middletown.
McClurg, James Patterson	Irregular	Nottingham, Pa.
McDaniel, George Glenn	Civil Eng.	Wilmington.
Miller, Jonas	Elect. Eng.	Henry Clay.
Mitchell, Robert Levis	Irregular	Elkton, Md.
Prouse, Clarence Martin	Classical	Charlestown, Md.
Speakman, Cummins Eliott Stockley	Gen. Sci.	Smyrna.
Stewart, David, Jr.	Mech. Eng.	New Castle.
Warburton, Henry Arlington	Lat. Sci.	Elkton, Md.

FRESHMAN CLASS.

Armstrong, Frederic Delaware	Mech. Eng.	Cooch's Bridge.
Best, Belford Henry	Irregular	Marshallton.
Clark, Frederick Curtis	Irregular	Glasgow.
Conner, James Moses	Civil Eng.	Magnolia.
Constable, William Pepper	Classical	Elkton, Md.
Crothers, Roman Rathburn	Irregular	Colora, Md.
Davis, James Thomas	Lat. Sci.	Wilmington.
Davis, Thomas Henry	Gen. Sci.	Blackbird.
Dutton, George Elliott	Lat. Sci.	Seaford.
Frazer, Joseph Heckart	Civil Eng.	Newark.
Hamilton, William Steele	Lat. Sci.	New Castle.
Hardesty, Eugene Cochran	Lat. Sci.	Wilmington.
Hickman, LeRoy Wheeler	Mech. Eng.	Wilmington.
Householder, Eugene Ross	Elect. Eng.	Delaware City.
Kyle, Matthew Levi	Civil Eng.	Wilmington.
Kyle, Ralph Briggs	Civil Eng.	Wilmington.
Leach, Thomas, Jr.	Lat. Sci.	Henry Clay.
Lockwood, George Ignatius	Agriculture	Warwick, Md.
Mackall, John Evans	Lat. Sci.	Elkton, Md.
Mitchell, John Henry	Irregular	Wilmington.
Pardee, John Everly Grove	Lat. Sci.	Dover.
Ponder, James, Jr.	Elect. Eng.	Milton.
Quillen, Emile Boniwill	Irregular	Harrington.
Reybold, Eugene	Elect. Eng.	Delaware City.
Sawin, Sanford Wales	Civil Eng.	Wilmington.
Smith, Gustavus Henderson	Lat. Sci.	McClellandsville.
Wharton, William Richardson Martin	Lat. Sci.	Stockton, Md.
Willis, Delaware James	Lat. Sci.	Newark.
Wright, Herman Levin	Lat. Sci.	Harrington.

SHORT COURSE IN AGRICULTURE.

Bastian, Harry Baxter	Felton.
Heyd, Robert Lawrence	Felton.

MILITARY ORGANIZATION.

COMMANDANT OF CADETS.

Captain E. S. Avis, U. S. Army.

BATALLION OF INFANTRY.

Major R. Constable, Commanding.
1st Lieutenant T. B. McKeon, Adjutant. (1)
Sergeant-Major H. L. Maier.
Musician E. Reybold.

COMPANY A.

Captains.

G. D. Woodward. (2)

1st Lieutenants.

A. H. Hartman. (3)

1st Sergeants.

C. D. Stockly. (1)

Sergeants.

T. R. Wolf, Jr. (1)
R. T. Cann, 3d. (3)
J. W. McCoy. (4)
E. B. Griffin. (5)

Corporals.

H. A. Warburton. (3)
W. F. Harrington. (4)
C. C. Cooper. (7)
E. S. Avis, Jr. (8)
D. Stewart. (10)

COMPANY B.

Captains.

E. J. Ayars. (1)

1st Lieutenants.

W. A. Trotter. (2)

1st Sergeants.

S. J. Ott. (2)

Sergeants.

C. C. McDonald. (2)
J. P. Cann. (6)
W. P. Naudain, Color. (7)
W. N. McMullin. (8)

Corporals.

P. Jones. (1)
C. E. S. Speakman. (2)
H. C. Evans. (5)
A. L. Clifton (6)
J. W. Huxley, Jr. (9)

INSTRUCTORS.

Major R. CONSTABLE, Infantry Drill Regulations.
Captain E. J. AYARS, Infantry Drill Regulations.
Captain G. D. WOODWARD, I. D. R., and Artillery Drill.
1st Lieut. T. B. McKEON, Adjutant, I. D. R., and Signalling.
1st Lieut. W. A. TROTTER, Infantry Drill Regulations.
1st Lieut. A. H. HARTMAN, Litter Drill.

LECTURER ON FIRST AID TO THE INJURED.

WALTER H. STEEL, M. D.

FIGURES IN ILLUSTRATION OF FIRST AID, BANDAGING, &c.

Cadets, H. R. TUNNELL AND F. EVANS.

YOUNG MEN'S CHRISTIAN ASSOCIATION.

J. HARRY MITCHELL, *President.*
GEO. E. DUTTON, *Vice President.*
DAVID STEWART, JR., *Corresponding Secretary.*
GEO. D. KELLEY, JR., *Recording Secretary.*
J. E. GROVE PARDEE, *Treasurer.*

PRESS ASSOCIATION.

WILLIS F. HARRINGTON, *Prest.* H. L. WRIGHT, *Vice Prest.*
J. P. MCCLURG, *Sec'y.* WM. R. M. WHARTON, *Treas.*

Review Staff.

CECIL C. MCDONALD, *Editor-in-Chief.*
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